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Breastfeeding and the Role of Maternal Religion: Results from a National Prospective Cohort Study

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ABSTRACT

Background

Recent research on religion and breastfeeding from a low-income, urban sample in the United States found that religious affiliation and religious attendance were associated with breastfeeding initiation.

Purpose

We assessed the relationship between religion (religious affiliation and religious attendance) and breastfeeding (initiation and duration) in a nationally representative prospective cohort study. We examined whether education and other sociodemographic characteristics mediated or moderated relationships.

Methods

Using data from the National Longitudinal Survey of Youth 1979 ($n = 3,719$), we regressed breastfeeding initiation and breastfeeding duration for first births on religious affiliation and religious attendance, comparing conservative Protestants to other religious groups.

Sociodemographic characteristics were explored as potential mediators or moderators of relationships.

Results

Other than Black Protestants, all religious groups reported higher odds of breastfeeding initiation compared to conservative Protestants (odds ratios = 1.43–3.01; all $P < .01$). All groups also breastfed longer than conservative Protestants, with the exception of Black Protestants and Catholics. Educational attainment explained breastfeeding initiation differences with the exception of nonaffiliates and “other” religious affiliates. Educational attainment also explained religious group breastfeeding duration differences with the exception of nonaffiliates. In our final

models, regular religious attendance was not directly associated with breastfeeding, but it magnified the breastfeeding duration advantage seen among mothers who had a later age at first birth.

Conclusions

The role of educational attainment in explaining breastfeeding differences between conservative Protestants and other groups suggests educational interventions may be beneficial within this population.

Key words: Breastfeeding, Breastfeeding Initiation, Breastfeeding Duration, Religion, Education

Breastfed children experience advantages including reduced risk of infectious morbidity, gastroenteritis, obesity, and diabetes [1,2]. Breastfeeding also benefits mothers, including reduced risk of breast cancer, ovarian cancer, type 2 diabetes, postpartum depression, and unfavorable birth spacing [1,2]. Healthy People 2020 promotes the goal of 81.2% breastfeeding initiation, 60.6% breastfeeding at six months, and 31.4% breastfeeding at one year [3,4]. Although US breastfeeding rates have risen in recent decades, recommended goals have not been reached and rates trail peer countries [5,6].

Growing attention has turned to identifying subgroups in which breastfeeding levels remain low in order to understand the social and cultural drivers of differential breastfeeding patterns. Research has shown that individuals with low breastfeeding rates are likely to be young, unmarried, less educated, obese, rural, live outside the western U.S., and have an unintended pregnancy. Additionally, non-Hispanic African American children have considerably lower rates of ever being breastfed (66%) compared to non-Hispanic white (84%) and Hispanic children (83%) [7]. Hispanic mothers may breastfeed at rates comparable to whites, despite lower socioeconomic status, due to the selection of healthy immigrants into the population and lower overall levels of US acculturation [8]. Explanations for African American mothers' disparity include greater likelihood of receiving formula-feeding advice from Women, Infants, and Children (WIC) program counselors, lack of information and support, lack of employer accommodation, and cultural beliefs such as negative views of breastfeeding in public, the belief that breast milk was not enough to satisfy a crying infant, and unfavorable views of breastfeeding based on historical experiences including an association of breastfeeding with low status and formula with high status [9–12].

Whereas breastfeeding promotion should continue to focus on high-risk groups, efforts also need to "make visible the wider cultural context in which infant-feeding choices are made" [13]. Religion may be an important aspect of the wider cultural context shaping breastfeeding. Despite an expanding body of research on religion and health [14], little research has examined religion and maternal and child health, including breastfeeding [15–17]. This gap in research is noteworthy because women tend to be more religious than men and women frequently increase their religious participation after becoming mothers [18].

Involvement in religious subcultures and congregations is associated with variations in a range of health behaviors [19–21], and may also shape breastfeeding [15]. In addition to socioeconomically disadvantaged religious groups such as Black Protestants, there are also reasons to hypothesize that conservative Protestant mothers may be less likely to breastfeed compared to many other religious groups. Comprising over one third of the adult population, conservative Protestantism is the largest U.S. religious tradition, and is also noteworthy in its subcultural distinctiveness [22,23]. A hallmark of conservative Protestantism is tension with mainstream society and dissociation from modern institutions [24]. One manifestation of this dissociation is relatively low educational attainment among conservative Protestants [25]. Conservative Protestants tend to be skeptical of secular sources of knowledge and accumulating education [26,27], and conservative Protestant women, in particular, frequently prioritize domestic roles over careers, which can lead to fewer years of schooling [28]. Research has consistently shown that conservative Protestants tend to attain lower levels of education compared to Mainline Protestants, Catholics, Jewish adherents, and nonaffiliates [28–34]. This is important because educational attainment is among the strongest predictors of breastfeeding and is thought to do so through fostering agency, enhanced networks, communication skills, analytic

abilities, and habits. It also affords economic resources, knowledge benefits, and medical care access [35–38]. Relatedly, another reason for low levels of breastfeeding among conservative Protestants is conservative Protestantism's emphasis on family formation and pro-natalism which is associated with early childbearing [31,39,40]. Though it is possible that prioritization of domestic roles among conservative Protestants could increase breastfeeding, younger age at first birth [37] is an important risk factor for low breastfeeding initiation and duration and, along with low educational attainment, may be an overriding factor leading to low breastfeeding among conservative Protestants.

Some aspects of religion, however, may support breastfeeding. Religious congregations often provide access to health behavior-promoting social support [41]. Religious attendance is associated with lower likelihood of risky health behaviors in pregnant and postpartum women [16] and greater likelihood of initiating breastfeeding [15]. Religious attendance also buffers the relationship between health behaviors and disadvantageous factors such as young age at first birth, low socioeconomic status, and racial minority status [39]. This buffering may extend to breastfeeding. Unlike advantaged mothers, who can draw from myriad secular resources, disadvantaged mothers may have fewer institutional resources upon which to draw for social, emotional, or material support, and thus religion may be more instrumental in disadvantaged mothers' breastfeeding behavior.

Our study advances previous work in several ways. Recent research on religion and breastfeeding in the US found that religious attendance and religious affiliation are associated with breastfeeding initiation [15,42]. One of these recent studies [42] was not able to establish time ordering, did not include religious service attendance, and did not make the important distinction between Mainline Protestants (e.g., Episcopalians) and conservative Protestants (e.g.,

Southern Baptists), groups that are culturally distinct and vary on a host of outcomes. A second study [15] used a socioeconomically disadvantaged sample of predominantly unmarried women and had limited generalizability outside of large urban areas. Though it measured religious attendance and made distinctions between Protestants, this prior study also used data with relatively few religious denominations measured, limiting the precision of religious categorizations. We expand upon prior work by using the National Longitudinal Survey of Youth, 1979 cohort (NLSY79), which allows for detailed longitudinal analysis of breastfeeding initiation and duration, sociodemographic information, and religious characteristics of mothers in a nationally representative sample. In addition to generalizability, another advantage of the NLSY79 over previous work is its more granular measurement of religion—over 150 denomination response options. To our knowledge, this is the most complete and generalizable study of religion and breastfeeding to date, taking into account the complete fertility history of a birth cohort, national representativeness, measurement quality, and prospective design.

METHODS

We used data from the NLSY79, an ongoing longitudinal survey of a nationally representative sample of 12,686 American youth aged 14 to 21 years old in 1978. Respondents were surveyed annually until 1994, after which the survey was administered biennially. This survey, sponsored by the Bureau of Labor Statistics, was principally designed to gather longitudinal information on the labor force experiences of young Americans, but is also one of the only national longitudinal surveys to gather detailed information on religion and breastfeeding. No institutional review was needed because all data were publicly available and did not identify individual survey participants.

We restricted our analyses to first births, giving a representative sample of all first births of this cohort. This strategy was used because it avoided skewing the analysis towards women with multiple births and because of the importance of first births for predicting women's breastfeeding decisions in subsequent births. We also excluded women who did not have valid breastfeeding information and women who had births prior to the initial interview to establish time order with religion variables. Waves after 2010 had no first births and were omitted. After these data restrictions, we corrected for missing data on independent variables using the *mi impute* command in Stata 13. The final analytic sample was 3,719 first-time mothers.

Compared to analogous first-time mothers not in our sample (mothers who had births prior to the first wave), our analytic sample was older at first birth and more advantaged—in terms of educational attainment, race, income, and marital status. The analytic sample did not include some very young first-time mothers because we dropped women who had births before the first survey wave when women were ages 14-22 to ensure that religious affiliation and attendance were measured prior to the birth. This suggests that our results are conservative because they excluded the most disadvantaged mothers least likely to breastfeed. Ancillary analyses confirmed that our results are conservative: when including all mothers with measures for the dependent variables, the coefficients for all independent variables were similar or larger in magnitude, but the p-values were smaller (due to the larger sample size).

Measures

Dependent Variables. The NLSY79 measured breastfeeding every year from 1983-1986 and biennially thereafter). The first dependent variable was a dichotomous initiation indicator that came from a question that asked, “When (child) was an infant, did you breast feed (him/her) at all?” (1=yes, else 0). The second dependent variable was breastfeeding duration. Because

leading health organizations recommend breastfeeding for at least one year and for as long as mutually desired by mother and child [43], we measured breastfeeding duration as a continuous variable indicating the number of months that the first child was breastfed. This variable was derived from a measure of how old the child was when breastfeeding ended. In the models predicting breastfeeding duration, we only included those who ever breastfed (n=2,048).

Independent Variables. Religious affiliation and religious attendance were our focal independent variables. Religious affiliation was based on a question asked in 1979 and was coded as a series of binary variables based on standard classifications of major religious traditions in the United States: nonaffiliated, conservative Protestant, Mainline Protestant, Black Protestant, Catholic, and “other” religion [44]. We followed most research in measuring religious attendance as an ordinal variable [45]. Religious attendance ranged from (1) not at all to (6) more than once per week.

We controlled for race-ethnicity, urbanicity, and southern region—background characteristics potentially predictive of both religion and breastfeeding. Race-ethnicity was measured in 1978 and included non-Hispanic Black (hereafter “Black”), Hispanic, and non-Hispanic white (hereafter “white”). Residence information was taken in the year closest to the birth. Urban indicated an urban residence (1=yes, 0=no) and South indicated if the mother lived in the South (1=yes, 0=no).

Other independent variables included education, age at first birth, age at marriage, income, and return to work variables—all were measured using dates of marriage, first birth, or employment, or—in the case of education and income—in the wave immediately preceding first birth. Education was measured as a categorical variable (less than high school, high school degree, some college, college degree or more). Age at first birth was a continuous measure

obtained by subtracting a woman's birth date from the date of the first birth and dividing by 12 (mean-centered in analyses). Age at marriage was a categorical variable (never married, <20, 25-29, 30-34, and 35+). Household income in the past year was measured in thousands of dollars. Return to work indicates whether the mother returned to full-time work after the birth (1=yes, 0=no). Time until return to work is a categorical variable (<2 months, 2-4 months, 4-6 months, and 6+ months). Table 1 presents descriptive statistics for study variables.

Table 1 about here

We used logistic regression when analyzing breastfeeding initiation and OLS regression when analyzing breastfeeding duration. We also examined mediation using the Karlson/Holm/Breen (KHB) method. All analyses used sampling weights to account for complex survey design.

RESULTS

Table 2 presents means or proportions of study variables by religious tradition. Breastfeeding initiation was highest among "other" religionists (79%), Mainline Protestants (68%), nonaffiliates (67%), and Catholics (64%), and lower among conservative Protestants (55%) and Black Protestants (27%). Mean breastfeeding duration (in months) followed a similar pattern: "other" affiliates (4.45), nonaffiliates (3.88), Mainline Protestants (3.79), Catholics (2.72), conservative Protestants (2.38), and Black Protestants (1.17). Thirteen percent of conservative Protestants completed college or more, compared to higher percentages among Mainline Protestants (31%), "other" religionists (26%), Catholics (20%), and nonaffiliates (18%). Black Protestants had the lowest level of higher education (8%). Whereas Black Protestants had the lowest mean age (in years) at first birth (23.25), conservative Protestants had

lower age at first birth (24.4) than nonaffiliates (25.25), “other” religionists (25.45), Mainline Protestants (26.41), and Catholics (26.44).

Table 2 about here

The bivariate logistic regression results in Model 1 of Table 3 showed significant breastfeeding initiation differences, with Black Protestants showing lower, and all other groups higher odds of initiation compared to conservative Protestants. Model 2 added potential confounders (race, urbanicity, and region). The initiation gap between Black Protestants and conservative Protestants was reduced to nonsignificance and the Mainline Protestant and Catholic advantages were slightly attenuated, with Catholic becoming marginally significant. The addition of religious service attendance (Model 3) resulted in an increase in the nonaffiliated coefficient. Model 4 examined whether religious differences were explained by educational attainment. Higher levels of education were significantly associated with greater odds of breastfeeding initiation. The nonaffiliated advantage lessened, the Mainline Protestant and Catholic advantages were reduced to nonsignificance, and the “other” religionist advantage decreased. Religious attendance became nonsignificant. Model 5 removed education and assessed whether the addition of age at first birth explained religious tradition differences. Later age at first birth was significantly associated with greater odds of initiation. Changes in focal variables were similar (but less dramatic) to Model 4 with lessened advantages for nonaffiliated and “other” groups and nonsignificance for Catholic. Mainline Protestant and religious attendance regained significance.

Model 6 added age at marriage, income, return to work, and time until work return, along with education and age at first birth. Never having married was significantly associated with lower odds of initiation (reference = married at 20-24). Never returning to work was significantly

associated with lower odds of initiation (reference = 2-4 months). In terms of religious tradition differences, Model 6 was similar to the model adding education (Model 4), suggesting that new variables in Model 6 did little more than education in explaining religious tradition initiation gaps.

Finally, to assess whether religious attendance buffered the risk posed to breastfeeding initiation by lower age at first birth, Model 7 tested for an interaction of these factors, which was not significant. Other interactions of religious attendance by race/ethnicity, urban, South, education, age at marriage, and income were also not significant (results not shown). Race/ethnicity by affiliation interactions did not yield significant results. Exceptions were marginally significant interactions of Hispanic by Catholic (vs. white conservative Protestant) and Black by other religion (vs. white Mainline Protestant).

Table 3 about here

Because of concerns regarding comparing coefficients across logistic regression models, we conducted formal mediation tests of the indirect effects of affiliation and attendance on breastfeeding initiation using the Karlson/Holm/Breen (KHB) method. Results are displayed in Appendix Table A1. The KHB method decomposes the direct and indirect effects of nonlinear models and shows the degree to which a control variable mediates an outcome variable. Although other methods exist to address cross-model effect comparisons in non-linear models, the KHB method is equivalent to those methods and in some instances superior [46]. One set of KHB analysis (not shown) mirrors Table 3, Model 4 and revealed that of the remaining significant and marginally significant religious affiliation effects on initiation, all were significantly mediated by education except for “other” religion, nonaffiliated, and attendance. The KHB analysis presented in Appendix Table A1 compared a model including the variables in

Table 3, Model 3 to a model with the variables in Table 3, Model 6. This analysis showed that the effect of nonaffiliates and “other” religion were partially mediated and explained by 24.8% and 25.2% respectively, and the effects of Mainline Protestant, Catholic, and attendance were fully mediated. By far the largest amount of mediation was attributable to educational attainment.

A bivariate OLS model of breastfeeding duration showed that nonaffiliates, Mainline Protestants, and “other” religionists had significantly longer duration than conservative Protestants (Table 4, Model 1). The potentially confounding effects of race, urbanity, and southern region in Model 2 somewhat lessened the nonaffiliated, Mainline Protestant, and “other” religion advantages. Model 3 added religious attendance, which was positive and statistically significant. In this model, coefficients for nonaffiliates and "other" religionists became larger and were all significant. Added in Model 4, educational attainment substantially decreased the size of the still significant nonaffiliate coefficient and dramatically reduced the size of the Mainline Protestant, "other" religion, and religious attendance coefficients. Mainline Protestant, "other," and attendance were also rendered non-significant. Next, education was removed to assess whether the addition of age at first birth explained religious differences (Model 5). Later age at first birth was significantly associated with longer breastfeeding duration. Compared to Model 3, effects for nonaffiliates, Mainline Protestants, and "other" religion were reduced but remained significant. The coefficient for religious attendance was significant and virtually unchanged.

In Model 6, age at marriage, income, work return, and time until work return were added along with education and age at first birth. Education coefficients were relatively similar but the size of the age at birth coefficient decreased considerably. Religious tradition differences in

Model 6 were virtually the same as the model adding education (Model 4), with the exception that Black Protestants had marginally significant longer duration compared to conservative Protestants. Other than this difference, the addition of Model 6 variables did nothing noticeably more than education alone in explaining the conservative Protestant duration disadvantages seen in Model 4.

Finally, Model 7 added an interaction term to assess whether religious attendance moderated the relationship between age at first birth and breastfeeding duration. In this marginally significant interaction shown in Figure 1, there was little difference in breastfeeding on the basis of religious attendance among young mothers. Additionally, nonattending mothers' breastfeeding duration was similar across younger and older ages at first birth. However, with later age at first birth a gap emerged and widened with regular attenders showing longer breastfeeding duration than non-attenders. An ancillary analysis indicated that the slope of religious attendance became marginally significant at 26.9 years of age, and significant when age at first birth is greater than 29.3 years. Importantly, it was not young mothers for whom religious attendance increases breastfeeding duration, but rather older mothers. Interactions of religious attendance by race/ethnicity, urban, South, education, age at marriage, and income were not significant (not shown). Race/ethnicity by affiliation interactions did not yield significant results. Survival analysis analyzing time to breastfeeding cessation (not shown) yielded similar results to those reported above and did not change conclusions.

Table 4 about here

Figure 1 about here

DISCUSSION

To our knowledge, this is the most complete and generalizable study of religion and breastfeeding in the US. We found several religious groups have breastfeeding advantages compared to conservative Protestants. Nonaffiliates, Mainline Protestants, Catholics, and “other” religionists were more likely to initiate breastfeeding, and these differences—with the exception of nonaffiliates and “other” religionists—were explained by educational attainment. In the case of breastfeeding duration, we found that nonaffiliates, Mainline Protestants, and “other” religionists breastfed longer than conservative Protestants. With the exception of nonaffiliates, these breastfeeding duration differences were explained by educational attainment. More frequent religious service attendance was also associated with breastfeeding initiation and longer breastfeeding duration and these associations were also mediated by educational attainment. Finally, our results showed regular religious attendance magnified the breastfeeding duration advantage seen among mothers who had first births at later ages.

The role of educational attainment in religious differences in breastfeeding supports the hypothesis that conservative Protestants’ relatively low levels of breastfeeding initiation and duration are largely due to low educational attainment. This finding adds to growing research documenting the ramifications of religious stratification in the US [47]. One implication is that those interested in promoting breastfeeding should look beyond proximal factors such as socioeconomic status, and examine background sources of these factors such as religious subcultures. Ironically, in the case of conservative Protestantism, its emphasis on marriage and family—to the extent these impede educational attainment—may have adverse effects on mothers and children via breastfeeding. Given that conservative Protestantism is the largest religious tradition in the US [48], our results have identified a large and important population for increasing breastfeeding along with a key mechanism. Our results suggest that increased

educational attainment may go far in increasing breastfeeding among conservative Protestants. Prior research has found that religious congregations can provide services to vulnerable populations [49,50]. Effective congregation-based programming aimed at encouraging educational attainment within this population could include developing interventions that promote education based on core conservative Protestant values. Education-promotion programming based on themes of personal responsibility or “lov[ing] the Lord with the whole mind” may be effective [27]. Recruiting lay leaders for programming within conservative Protestant congregations may be particularly valuable since these leaders have considerable sway [51], though clergy may also be key. To sustain efforts, a national conservative Protestant network focused on aiding local leaders involved in education promotion could be developed.

Nonaffiliates’ breastfeeding initiation and duration advantages remained robust in analyses. Nonaffiliates may have a stronger inclination for more natural approaches, including breastfeeding their children, an idea future research should explore. Our results differed from previous work [15] which did not find that nonaffiliates were more likely to initiate breastfeeding compared to other groups. This prior work’s sample differed from ours in several ways: (1) it was made up of primarily low-SES unmarried women in large urban areas; (2) the sample mothers had a first birth prior to the survey; and (3) it was more recent and did not include a complete fertility history. In contrast, we used a nationally representative sample of all first births in a cohort with a complete fertility history, which included higher SES and married women. These sample dissimilarities may account for differences in results. Additionally, some prior work examining different groups within the nonaffiliated found that nonaffiliates who also have religious beliefs have worse health (e.g., physical problems, mental problems, pain, depressive symptoms, low energy, and general anxiety) [52]. Future research should explore

nonaffiliate subgroup variations in breastfeeding and underlying mechanisms such as lifestyle orientations and beliefs. In particular, Americans who are “spiritual but not religious” should be examined [53].

Our results also differed from those of prior work [15] in that the significant associations between religious attendance and breastfeeding initiation and duration were mediated by educational attainment. Further research is needed to assess the overall role of religious attendance in breastfeeding. Based on prior research, we predicted that religious attendance would buffer factors known to be disadvantageous for breastfeeding. Religious attendance had a marginally significant, yet robust, interaction with age at first birth in the case of breastfeeding duration, but the relationship was not as expected. We found little difference in breastfeeding on the basis of religious attendance among young mothers. Also, nonattending mothers’ breastfeeding duration was similar across younger and older ages at first birth. However, with *later* age at first birth, regular attenders had longer breastfeeding duration. Older religious attenders tend to be more socially embedded in their congregations [54] and older mothers may be more likely to receive social support from their congregation-based social ties. Compared to breastfeeding initiation, breastfeeding duration is much more heavily dependent on mothers’ access to information and support in overcoming a variety of problems encountered in breastfeeding (e.g., latch difficulties) [55]. A well-developed and supportive social network can provide access to knowledge and encouragement as mothers troubleshoot and overcome challenges in ongoing breastfeeding. Congregational programs intended to support mothers may need stronger efforts to engage younger mothers and provide access to supportive networks and resources.

The majority of births in the current study occurred from 1979 through the 1980s and it is possible that this timeframe conditioned results. Breastfeeding rates in the U.S. rose sharply after 1972 following the rise of the natural-childbirth movement and pro-breastfeeding norms associated with the “politics and communalism of the time” [56]. Specifically, breastfeeding rates were likely improved by an increase in unmedicated delivery, immediate breastfeeding, infant-directed nursing, "rooming-in" after the birth, and breastfeeding support organizations such as La Leche League [13]. Negative publicity for formula corporations and some restrictions on the marketing of formula to mothers also took place around this time. A modest breastfeeding decline occurred in the mid-1980s as formula corporations began marketing directly to the public. Breastfeeding became increasingly popular again starting in the late 1980s. Around this time and thereafter several factors likely contributed to ongoing increases in breastfeeding including the Baby Friendly Hospital Initiative, the Family and Medical Leave Act, and especially the improved WIC breastfeeding programming for low-income women. Whereas the effects of maternal educational attainment are consistent in different time periods in the mid-to-late 20th century [13], future research using nationally representative prospective data on a birth cohort’s complete fertility history should replicate the current study in a later birth cohort to assess whether changes in societal norms condition religious patterns in breastfeeding.

Though this study sheds new light on social factors associated with breastfeeding, like almost all nationally representative samples, the measurement of breastfeeding was limited. Exclusivity was not captured in the data. Exclusivity measurement would provide a more comprehensive assessment of breastfeeding practices. Additionally, prior research suggests that religion can affect educational attainment and that educational attainment can affect religious involvement. Though recent research suggests that higher education effects on religious beliefs

are weak and inconsistent [57]. Although the data show time ordering in the context of a cohort's complete fertility history, selection effects cannot be wholly ruled out and the current study cannot prove causality. There are also complex connections between race/ethnicity, region, and religion and these factors are historically intertwined [58,59]. Future research using larger sample sizes and more granular geographic data should seek to more fully assess these intersections and breastfeeding. Finally, data limitations did not allow us to analyze religious beliefs and social networks [60], factors associated with health behaviors in prior research [61]. Health practitioners and researchers would be aided by work addressing limitations and exploring these potentially fruitful directions.

CONCLUSION

The current study contributes to our understanding of social factors and breastfeeding and it aligns with growing work showing that our knowledge of social factors and health behaviors can be advanced by examining religious subcultures [19]. In more general terms, we have underscored an important relationship between culture and maternal health behavior. Religious subcultures are prevalent in American society and offer to enrich our understanding of breastfeeding.

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Table 1. Descriptive statistics for study variables

	Mean/proportion	SD
Breastfed	0.61	
Breastfeeding Duration (months) ^a	3.00	4.61
Religious tradition		
Nonaffiliated	0.09	
Conservative Protestant	0.21	
Mainline Protestant	0.20	
Black Protestant	0.09	
Catholic	0.32	
Other	0.10	
Race / ethnicity		
Hispanic	0.07	
Black	0.12	
White	0.81	
Urban	0.78	
South	0.34	
Religious attendance	3.44	1.69
Educational attainment		
< High school	0.16	
High school	0.43	
Some College	0.21	
College +	0.20	
Age at Birth	25.53	5.20
Age at Marriage		
Never Married	0.07	
<20	0.24	
20-24	0.43	
25-29	0.18	
30-34	0.05	
35+	0.03	
Income	40.94	76.75
Return to work full-time	0.75	
Time until return to work		
Never returned	0.04	
<2 months	0.42	
2-4 months	0.10	
4-6 months	0.06	
6+ months	0.38	
<i>n</i>	3,719	

SD = standard deviation. All analyses are weighted. ^aBreastfeeding duration *n* = 2,048.

Table 2. Means or proportions of study variables by religious tradition

	All	Non	CP	MP	BP	C	Other	F
Breastfed	0.61	0.67 ^{ace}	0.55 ^{bcd}	0.68 ^{ace}	0.27 ^{bdef}	0.64 ^{ace}	0.79 ^{abcd}	49.81***
Breastfeeding Duration (months) ¹	3.00	3.88 ^{acd}	2.38 ^{bcef}	3.79 ^{acd}	1.17 ^{abdef}	2.72 ^{bcef}	4.45 ^{acd}	29.12***
Race / ethnicity								69.68***
Hispanic	0.07	0.03 ^{bcd}	0.02 ^{bcd}	0.01 ^{acdef}	0.00 ^{abdef}	0.16 ^{abcef}	0.04 ^{bcd}	
Black	0.12	0.10 ^{abcd}	0.03 ^{bcef}	0.01 ^{acdef}	0.97 ^{abdef}	0.03 ^{bcef}	0.10 ^{abcd}	
White	0.81	0.87 ^{abcd}	0.95 ^{bcd}	0.98 ^{acdef}	0.03 ^{abdef}	0.80 ^{abef}	0.86 ^{ab}	
Urban	0.78	0.78 ^{ade}	0.64 ^{bcd}	0.75 ^{acde}	0.83 ^{ab}	0.86 ^{abf}	0.84 ^{abf}	16.73***
South	0.34	0.25 ^{acd}	0.61 ^{bdef}	0.27 ^{acd}	0.63 ^{bdef}	0.17 ^{abcef}	0.29 ^{acd}	77.36***
Religious attendance	3.44	1.66 ^{abcde}	3.92 ^{bdef}	3.33 ^{cdf}	4.05 ^{def}	3.57 ^{ef}	3.27 ^f	138.91***
Educational attainment								11.77***
< High school	0.16	0.24 ^{bde}	0.22 ^{bde}	0.09 ^{acdef}	0.27 ^{bde}	0.13 ^{abcf}	0.15 ^{bcef}	
High school	0.43	0.45 ^e	0.50 ^{bcd}	0.4 ^a	0.38 ^{ad}	0.44 ^{ace}	0.34 ^{afd}	
Some College	0.21	0.14 ^{cde}	0.16 ^{cde}	0.20 ^c	0.27 ^{abf}	0.23 ^{af}	0.24 ^{af}	
College +	0.2	0.18 ^{bce}	0.13 ^{bcd}	0.31 ^{acdf}	0.08 ^{abdef}	0.2 ^{abc}	0.26 ^{acf}	
Age at Birth	25.53	25.25 ^{bcd}	24.40 ^{bcd}	26.41 ^{acef}	23.25 ^{abdef}	26.44 ^{acef}	25.45 ^{abcd}	30.23***
Age at Marriage								15.08***
Never Married	0.07	0.09 ^{abc}	0.04 ^{cf}	0.04 ^{cf}	0.27 ^{adef}	0.05 ^c	0.06 ^c	
<20	0.24	0.25 ^{acd}	0.42 ^{bcd}	0.20 ^{ac}	0.10 ^{abdef}	0.17 ^{acf}	0.21 ^{ac}	
20-24	0.43	0.37 ^{bd}	0.37 ^{bd}	0.51 ^{acf}	0.33 ^{bde}	0.47 ^{acf}	0.44 ^c	
25-29	0.18	0.20 ^a	0.12 ^{bdef}	0.19 ^a	0.15 ^d	0.21 ^a	0.2 ^a	
30-34	0.05	0.03 ^{cd}	0.03 ^{cd}	0.05 ^c	0.09 ^{af}	0.07 ^{af}	0.05	
35+	0.03	0.05 ^b	0.02 ^c	0.01 ^{ce}	0.06 ^{bd}	0.02 ^c	0.04 ^b	
Income	40.94	29.35 ^{bde}	37.71	45.35 ^{cf}	25.45 ^{bde}	44.95 ^{cf}	49.9 ^{cf}	4.62***
Return to work	0.75	0.73 ^c	0.77 ^{ce}	0.73 ^c	0.85 ^{abdef}	0.73 ^c	0.70 ^{ac}	6.76***
Time until return to work								3.15***
Never returned	0.04	0.01 ^{bde}	0.03 ^d	0.04 ^f	0.02 ^{de}	0.05 ^f	0.07 ^f	
<2 months	0.42	0.37 ^b	0.43 ^c	0.46 ^{cf}	0.34 ^{abd}	0.42	0.40	
2-4 months	0.1	0.08	0.09	0.12	0.09	0.11	0.09	
4-6 months	0.06	0.07	0.06	0.05	0.05	0.06	0.04	
6+ months	0.38	0.46 ^{bd}	0.39 ^c	0.33 ^{cf}	0.49 ^{abde}	0.36 ^f	0.40	
n	3719	302	659	547	619	1263	329	

¹n = 2,048. All analysis are weighted. Non=nonaffiliated; CP = conservative Protestant; MP = Mainline Protestant; BP = Black Protestant; C=Catholic. ^aSignificantly different (p<.05) from CP. ^bSignificantly different (p<.05) from MP. ^cSignificantly different (p<.05) from BP. ^dSignificantly different (p<.05) from Catholic.

^eSignificantly different (p<.05) from "other" religion. ^fSignificantly different (p<.05) from nonaffiliated.

***p < 0.001

Table 3. Multivariate binary logistic regression models estimating odds of breastfeeding initiation (*n*=3,179)

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Religious tradition (vs. CP)														
Nonaffiliated	1.64**	(1.17, 2.31)	1.57*	(1.10, 2.24)	1.79**	(1.23, 2.61)	1.58*	(1.08, 2.31)	1.69**	(1.14, 2.49)	1.61*	(1.09, 2.39)	1.60*	(1.08, 2.37)
MP	1.71***	(1.30, 2.25)	1.48**	(1.11, 1.97)	1.53**	(1.15, 2.04)	1.11	(0.82, 1.51)	1.35*	(1.00, 1.81)	1.09	(0.80, 1.48)	1.09	(0.80, 1.48)
BP	0.30***	(0.23, 0.39)	0.75	(0.51, 1.11)	0.76	(0.51, 1.13)	0.71†	(0.48, 1.05)	0.73	(0.49, 1.09)	0.72	(0.48, 1.08)	0.72	(0.48, 1.08)
Catholic	1.43**	(1.13, 1.82)	1.27†	(0.97, 1.65)	1.29†	(0.99, 1.68)	1.03	(0.78, 1.36)	1.1	(0.84, 1.45)	0.98	(0.74, 1.30)	0.98	(0.74, 1.30)
Other	3.01***	(2.09, 4.33)	2.97***	(2.03, 4.35)	3.08***	(2.09, 4.53)	2.50***	(1.68, 3.72)	2.91***	(1.98, 4.29)	2.52***	(1.69, 3.77)	2.53***	(1.69, 3.78)
Race / ethnicity (vs. white)														
Hispanic			0.78*	(0.62, 0.99)	0.78*	(0.62, 0.98)	0.99	(0.77, 1.26)	0.92	(0.72, 1.16)	1.14	(0.89, 1.46)	1.14	(0.89, 1.46)
Black			0.36***	(0.27, 0.50)	0.35***	(0.26, 0.48)	0.35***	(0.26, 0.48)	0.39***	(0.29, 0.54)	0.46***	(0.33, 0.64)	0.46***	(0.33, 0.63)
Urban			1.09	(0.87, 1.38)	1.1	(0.87, 1.38)	1.02	(0.80, 1.29)	1.06	(0.84, 1.34)	1.02	(0.80, 1.30)	1.03	(0.80, 1.31)
South			0.73**	(0.60, 0.88)	0.71***	(0.59, 0.87)	0.66***	(0.54, 0.81)	0.70***	(0.57, 0.85)	0.64***	(0.52, 0.79)	0.64***	(0.52, 0.79)
Religious attendance					1.06*	(1.01, 1.12)	1.02	(0.96, 1.08)	1.06*	(1.00, 1.12)	1.01	(0.96, 1.07)	0.88	(0.67, 1.14)
Educational attainment (vs. <High school)														
High school							1.43**	(1.12, 1.81)			1.32*	(1.02, 1.71)	1.32*	(1.02, 1.71)
Some College							3.12***	(2.36, 4.13)			2.70***	(1.97, 3.70)	2.71***	(1.98, 3.71)
College +							4.59***	(3.31, 6.38)			3.69***	(2.49, 5.48)	3.65***	(2.46, 5.41)
Age at Birth									1.07***	(1.05, 1.09)	1.04**	(1.01, 1.06)	1.02	(0.97, 1.06)
Age at Marriage (vs. 20-24)														
Never Married											0.48***	(0.34, 0.68)	0.48***	(0.35, 0.68)
<20											1.16	(0.91, 1.48)	1.16	(0.91, 1.48)
25-29											0.89	(0.67, 1.18)	0.89	(0.67, 1.18)
30-34											1.16	(0.77, 1.75)	1.14	(0.76, 1.73)
35+											0.64†	(0.37, 1.08)	0.65	(0.38, 1.10)
Income											1.00	(1.00, 1.00)	1.00	(1.00, 1.00)
Return to work full-time											0.65***	(0.52, 0.82)	0.65***	(0.52, 0.82)
Time until return to work (vs. 2-4 months)														
Never returned											1.03	(0.60, 1.76)	1.02	(0.59, 1.74)
<2 months											1.06	(0.77, 1.46)	1.06	(0.77, 1.46)
4-6 months											0.93	(0.58, 1.47)	0.93	(0.58, 1.47)
6+ months											1.04	(0.76, 1.44)	1.04	(0.76, 1.44)
Religious attendance X age at birth													1.01	(1.00, 1.02)

CI=confidence interval; CP=conservative Protestant; MP=Mainline Protestant; BP=Black Protestant. †*p*<0.10; *p<0.05; **p<0.01; ***p<0.001, two-tailed test.

Table 4. Multivariate ordinary least squares regression models of breastfeeding duration ($n=2,048$)

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
	<i>b</i>	(95% CI)	<i>b</i>	(95% CI)	<i>b</i>	(95% CI)	<i>b</i>	(95% CI)	<i>b</i>	(95% CI)	<i>b</i>	(95% CI)	<i>b</i>	(95% CI)
Religious tradition (vs. CP)														
Nonaffiliated	1.49*	(0.16, 2.81)	1.36*	(0.01, 2.71)	1.92**	(0.47, 3.36)	1.43*	(0.05, 2.81)	1.78*	(0.35, 3.21)	1.49*	(0.11, 2.86)	1.45*	(0.08, 2.83)
MP	1.27*	(0.29, 2.26)	1.13*	(0.12, 2.14)	1.28*	(0.27, 2.29)	0.6	(-0.41, 1.60)	0.99*	(0.00, 1.98)	0.64	(-0.34, 1.61)	0.62	(-0.36, 1.59)
BP	0.02	(-0.98, 1.03)	0.96	(-0.35, 2.26)	1.06	(-0.26, 2.38)	0.91	(-0.38, 2.20)	0.97	(-0.33, 2.27)	1.12†	(-0.21, 2.45)	1.14†	(-0.18, 2.46)
Catholic	-0.06	(-0.81, 0.70)	-0.13	(-0.98, 0.72)	-0.06	(-0.91, 0.80)	-0.47	(-1.33, 0.40)	-0.42	(-1.29, 0.46)	-0.58	(-1.42, 0.26)	-0.62	(-1.46, 0.22)
Other	1.34*	(0.25, 2.43)	1.27*	(0.14, 2.41)	1.45*	(0.30, 2.61)	0.91	(-0.22, 2.05)	1.29*	(0.14, 2.44)	0.88	(-0.20, 1.96)	0.89	(-0.19, 1.97)
Race / ethnicity (vs. white)														
Hispanic			-0.55	(-1.26, 0.16)	-0.59	(-1.31, 0.12)	-0.09	(-0.79, 0.61)	-0.23	(-0.94, 0.47)	0.28	(-0.43, 0.98)	0.32	(-0.38, 1.02)
Black			-0.96*	(-1.87, -0.04)	-1.07*	(-2.00, -0.15)	-0.99*	(-1.91, -0.08)	-0.88†	(-1.80, 0.03)	-0.75	(-1.76, 0.26)	-0.74	(-1.74, 0.25)
Urban			-0.15	(-0.90, 0.60)	-0.13	(-0.87, 0.62)	-0.29	(-1.02, 0.43)	-0.2	(-0.93, 0.52)	-0.27	(-1.00, 0.45)	-0.23	(-0.95, 0.48)
South			-0.49	(-1.19, 0.20)	-0.54	(-1.24, 0.15)	-0.71*	(-1.41, -0.02)	-0.58†	(-1.28, 0.11)	-0.63†	(-1.32, 0.05)	-0.63†	(-1.31, 0.06)
Religious attendance					0.24*	(0.05, 0.43)	0.11	(-0.07, 0.30)	0.22*	(0.04, 0.41)	0.14	(-0.04, 0.32)	-0.6	(-1.39, 0.19)
Educational attainment (vs. <High school)														
High school							0.53	(-0.15, 1.22)			0.65†	(-0.08, 1.37)	0.66†	(-0.07, 1.38)
Some College							1.51***	(0.65, 2.38)			1.64***	(0.69, 2.60)	1.67***	(0.72, 2.63)
College +							3.03***	(2.09, 3.97)			2.91***	(1.81, 4.00)	2.89***	(1.79, 3.98)
Age at Birth									0.16***	(0.10, 0.22)	0.09*	(0.01, 0.17)	0	(-0.14, 0.13)
Age at Marriage (vs. 20-24)														
Never Married											0.05	(-1.20, 1.31)	0.06	(-1.18, 1.29)
<20											0.61†	(-0.11, 1.34)	0.61†	(-0.11, 1.34)
25-29											-0.3	(-1.28, 0.68)	-0.33	(-1.30, 0.65)
30-34											0.61	(-0.98, 2.20)	0.5	(-1.07, 2.08)
35+											1.2	(-1.28, 3.67)	1.28	(-1.19, 3.75)
Income											0	(-0.00, 0.01)	0	(-0.00, 0.01)
Return to work full-time											-1.10**	(-1.81, -0.39)	-1.08**	(-1.79, -0.38)
Time until return to work (vs. 2-4 months)														
Never returned											3.10***	(1.27, 4.93)	3.04**	(1.22, 4.86)
<2 months											0.84*	(0.11, 1.57)	0.86*	(0.12, 1.60)
4-6 months											1.54*	(0.28, 2.81)	1.54*	(0.28, 2.81)
6+ months											2.05***	(1.21, 2.88)	2.05***	(1.20, 2.89)
Religious attendance X age at birth													0.03†	(-0.00, 0.06)
Constant	4.30***	(3.68, 4.93)	4.70***	(3.82, 5.59)	3.74***	(2.61, 4.88)	3.37***	(2.18, 4.57)	-0.15	(-1.98, 1.69)	0.06	(-2.28, 2.40)	2.45	(-1.18, 6.07)

b = unstandardized coefficient; CI = confidence interval; CP = conservative Protestant; MP = Mainline Protestant; BP = Black Protestant. † $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$, two-tailed test

Figure 1. Interplay Between Age at First Birth, Religious Attendance, and Predicted Months Breastfed: United States, 1979-2010

Table A1. Karlson/Holm/Breen mediation of religious affiliation effects on breastfeeding initiation ($n = 3,179$)

	Nonaffiliated ^a	MP ^a	BP ^a	Catholic ^a	Other ^a	Attendance
Total effect	0.62**	0.44**	-0.31	0.25†	1.23***	0.06*
Direct effect	0.47*	0.08	-0.34	-0.03	0.92***	0.01
Indirect effect	0.15	0.36**	0.03	0.29*	0.31*	0.05
% confounding	24.76	82.3	-10.93	112.26	25.19	80.95
% of indirect effect explained by variable ^b						
Educational attainment	95.98	83.05	179.8	74.42	84.69	81.94
Age at birth	27.31	20.06	61.99	30.27	14.21	4.4
Age at marriage	-23.85	-3.88	-113.99	-6.34	-6.43	13.04
Income	-0.93	0.14	1.26	0.25	0.41	0.15
Return to work full-time	1.98	0.29	-40.1	1.66	6.56	0.45
Time until return to work	-0.48	0.33	11.02	-0.27	0.57	0.01

MP = Mainline Protestant; BP = Black Protestant; Attendance = religious attendance. ^aReferent = conservative Protestant.

Models control race/ethnicity, urban, and South and use a single data imputation. ^bSome values are negative due to coefficient increase, rather than decrease, with the addition of the mediator variable. † $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$