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Are the faithful becoming less fruitful? The decline of conservative protestant fertility and the growing importance of religious practice and belief in childbearing in the US

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ABSTRACT

Studies of religion and fertility argue that American childbearing has become less predicated on religious tradition and more on religious commitment and belief. Yet studies have not documented this transition over time or considered whether the growing importance of religious commitment and belief in childbearing applies across Christian traditions equally. Using data from the 1972–2016 General Social Surveys, we analyze childbearing trends across time and birth cohort focusing on the independent and interrelated effects of religious tradition, religious practice, and theological fundamentalism. We also utilize zero-inflated negative binomial regression models to better account for the increasing number of Americans who forego childbearing. Conservative Protestant affiliation is associated with faster than average declines in fertility, while monthly church attendance and biblical literalism are associated with slower than average declines in fertility, ceteris paribus. Examining moderating relationships, monthly worship attendance slightly *increases* the childbearing of mainline Protestants and Catholics over time, while conservative Protestant childbearing declines regardless of attendance. Unless offset by switching, our findings portend future population declines for conservative Protestants, notably, ones that are not attenuated by greater religious commitment.

01. Introduction

Americans have long experienced higher rates of fertility compared to other developed nations, at least in part, because they tend to be relatively more religious than citizens of other nations (Adsera, 2014; Ellison et al., 2018; Frejka and Westoff, 2008; Lehrer, 1996).[1] Within the past hundred years, higher rates of fertility were initially observed among Catholics and conservative Protestant groups compared to mainline Protestants (Freedman et al., 1961), with Catholic birthrates declining tremendously as commitment among Catholics waned and religious strictures against birth control became more lax (Kertzer, 2006; Lehrer, 1996; Mosher and

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[1] The issue of causal ordering in studies of religion and fertility is controversial. While some have argued that having children shapes individuals' attachment to conventional religion over time (Ellison et al., 2018; Stolzenberg et al., 1995), recent panel studies have shown that childbearing did not predict higher rates of church attendance either in the United States (Schleifer and Chaves, 2017) or Europe (Berghammer, 2012). Moreover, Pearce (2002; Pearce and Davis, 2016) has repeatedly affirmed with panel data that early religious exposure predicts fertility attitudes and behavior later on. Thus, while our study draws on replicated cross-sectional data rather than panel data (see also Ellison et al., 2018; Hackett, 2008; Hout et al., 2001; Schnabel, 2018), and consequently, we cannot definitively demonstrate causality, we believe there is strong precedent for our assumption that religious characteristics predict childbearing behavior (see arguments in Adsera, 2014 and McQuillan, 2004).

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Hendershot, 1984; Mosher et al., 1992; Westoff and Jones, 1979; Williams and Zimmer, 1990). Conservative Protestants, by comparison, have maintained higher rates of fertility, though there is also some evidence that this group is starting to experience some stagnation (Chaves, 2017; Hout et al., 2001; Skirbeckk et al., 2010). Within the past few decades, work focusing on religion's relationship to childbearing has also drawn attention to the growing importance of religious practice and commitment, rather than tradition, as a better predictor of childbearing attitudes, intentions, decisions, and outcomes (Adsera, 2006, 2014; Hackett, 2008; Hayford and Morgan, 2008; Kertzer, 2006; Sigalow et al., 2012; Westoff and Marshall, 2010; Zhang, 2008).

While these studies have made vital contributions to our understanding of how religion shapes fertility, most of these studies have observed associations between religion and childbearing either using data taken at one point in time (Hayford and Morgan, 2008; Lehrer, 1996; Zhang, 2008; but see Goldscheider and Mosher, 1991) or over relatively brief periods of time (Hackett, 2008; Skirbeckk et al., 2010); focusing on various sub-populations (Heaton, 1986, 1989; Westoff and Marshall, 2010; Williams and Zimmer, 1990); or often only women (Frejka and Westoff, 2008; Hayford and Morgan, 2008; Westoff and Jones, 1979; Westoff and Marshall, 2010; Williams and Zimmer, 1990). What remains missing is an analysis of how indicators of religious commitment and belief intersect with religious traditions to influence childbearing over longer periods of time among representative samples of men and women. Such an analysis is needed in order to both deepen our understanding of how religion matters for shaping fertility patterns in the United States, but also for predicting the future childbearing trajectories of large segments of the American population like Catholics or conservative Protestants.

The current study aims to fill this gap by providing an analysis of childbearing trends for American men and women by period and birth cohort, focusing on the independent and interrelated effects of religious tradition—and conservative Protestantism in particular as the religious tradition most recently associated with stronger fertility intentions and outcomes (Hout et al., 2001)—along with religious commitment and theological fundamentalism. To accomplish this, we analyze data on women and men who have likely completed their childbearing (age 45 +) from the 1972–2016 General Social Surveys. Because of the growing number of Americans who are remaining childless within the past few decades, we employ zero-inflated negative binomial regression models that can provide more efficient estimates of fertility trends compared to previous studies. Before proceeding with our analysis, we first briefly survey key findings and gaps in research on religion, religiosity, and childbearing, and discuss how this research grounds our expectations.

2. Religion and fertility in the United States

Some of the earliest systematic investigations into American fertility patterns considered the important role of religion (Freedman et al., 1959; Freedman et al., 1961; Westoff, 1959). Freedman et al.'s (1961) comparative study of Catholics, Protestants, and Jews built on established trends showing Roman Catholics tended to have the highest fertility rates, Jews the lowest, and Protestants in the middle. Freedman and his colleagues showed that the Catholic differential in fertility could not be fully explained by socio-economic factors suggesting that Catholics' distinctive pronatalist subculture accounted for the difference. Later studies by Westoff and Jones (1979; see also Mosher and Hendershot, 1984) would observe that Catholic fertility had declined and nearly converged with that of non-Catholic Americans by the mid-1970s, likely connected to the growing secularization of Catholics and Catholic birth control practices (Westoff and Bumpass, 1973). Importantly, while Westoff and Jones (1979) found that highly-committed Catholics were becoming no different in their marital fertility than less committed Catholics, a replication by Mosher and Hendershot (1984) showed that more devout Catholics still exhibited higher fertility patterns than less committed ones.

This early research marked a growing concern in studies of religion and fertility to consider indicators of religious *commitment* and *belief*, as well as with breaking down broader religious affiliations like "Protestant" to consider "conservative" or "fundamentalist" Protestants (see the discussion in McQuillan, 2004; for seminal works, see Goldscheider and Mosher, 1991; Heaton, 1986; Hout et al., 2001; Lehrer, 1996; Mosher et al., 1992; Williams and Zimmer, 1990). One consistent finding within this literature was that frequent worship attendance seemed to have a robust association with the fertility of sectarian Protestant groups, though not always Catholics (Heaton, 1986; Mosher et al., 1992; Williams and Zimmer, 1990). It was also observed that conservative Protestants had consistently higher fertility than mainliners, regardless of their specific theological beliefs, suggesting that conservative Protestant fertility in previous years may have been related to subcultural values, not explicitly religious values (Hout et al., 2001). Hout et al. (2001) also pointed out, however, that the conservative Protestant advantage in fertility over mainline Protestants had subsided in more recent cohorts, suggesting a convergence of childbearing values and practices. Also distinguishing different subcultural values across religious groups, researchers have more recently recognized the stark fertility differences between more secularized white Catholics and the growing percentage of Hispanic, foreign-born Catholics who tend to be relatively more traditionalist and pronatalist, thus, likely bolstering Catholic fertility numbers (Skirbeckk et al., 2010).

More recent work on religion and childbearing has observed that religious traditions and affiliations seem to matter less and less in predicting fertility behavior compared to religious commitment (Frejka and Westoff, 2008; Hayford and Morgan, 2008; Pearce and Davis, 2016; Westoff and Marshall, 2010; Zhang, 2008; but see Hackett, 2008). Zhang's (2008) study of 2002 National Survey of Family Growth (NSFG) data, for example, found no significant differences between Christian traditions in predicting children ever born, but strong differences by importance of religious beliefs (see also Hayford and Morgan, [2008] who use the same NSFG data, but do not control for religious affiliation). Similarly, Westoff and Marshall (2010), using several different data sources, found that religious tradition did not predict differences in children ever born, but measures of religious importance did.

Among the limitations of previous research on religion and childbearing is that surprisingly few have used data that cover long periods of time, which would be necessary to track changing trends in the importance of religiosity variables for predicting fertility outcomes. With few important exceptions (e.g., Hout et al., 2001; Goldscheider and Mosher, 1991; Sander, 1992; Westoff and Jones,

1979), the majority of seminal works on the topic of religion and fertility have been based on cross-sectional data from one or two waves of the NSFG (e.g., Frejka and Westoff, 2008; Hayford and Morgan, 2008; Mosher and Hendershot, 1984; Mosher et al., 1992; Zhang, 2008; Westoff and Marshall, 2010) or other cross-sectional data sets (Heaton, 1986; Lehrer, 1996; Sigalow et al., 2012). Others are based on simulations drawn from multiple data sources, often from one point in time (e.g., Hackett et al., 2015; Scheitle et al., 2011; Skirbeckk et al., 2010). Moreover, among the exceptions where long periods of fertility behavior have been examined using multiple waves of data, studies either focused explicitly on comparisons between specific subpopulations (e.g., Catholics vs. Non-Catholics, see Sander, 1992; Westoff and Jones, 1979; or conservative Protestant vs. mainline Protestant, see Hout et al., 2001), and sometimes neglected religiosity as a consideration (Hout et al., 2001).

Consequently, while numerous studies have described what they perceive to be a growing importance of religious commitment and belief, and a corresponding diminishing importance of religious affiliation or tradition in predicting childbearing in the United States (Hackett, 2008; Hayford and Morgan, 2008; Zhang, 2008), no studies have been able to document this trend with a representative sample of American men and women. Additionally, no studies have been able to demonstrate how these patterned associations between religious commitment/belief and childbearing over time may differ by religious tradition. The current study represents the first attempt to fill these gaps using representative data on American women and men who have likely completed their fertility from the 1972–2016 General Social Surveys (GSS).

3. Theory and expectations

Previous research leads us to predict several outcomes. Scholars have long theorized that different religious subcultures hold particular beliefs about families and childbearing and consequently will tend to evidence higher fertility than other groups without that subcultural value (Hayford and Morgan, 2008; McQuillan, 2004; Pearce, 2002; Perry, 2017; Zhang, 2008). Historically, this theory was used to explain the higher observed fertility of conservative Protestants, Catholics, and Mormons compared to mainline Protestants, Jews, and secular Americans (Freedman et al., 1961; Hackett, 2008; Heaton, 1986). Some research has found support for this theory by showing that socio-economic differences and even differentials in religious importance or participation did not necessarily wash out the childbearing differences across specific religious groups (Hackett, 2008; Pearce and Davis, 2016; Sigalow et al., 2012). Yet several longitudinal studies have observed decreasing fertility differentials, first between Catholics and non-Catholics (Westoff and Jones, 1979) and then conservative Protestants and mainline Protestants (Hout et al., 2001).

While much earlier research focused on the Catholic/non-Catholic differential in fertility, here we focus more on conservative Protestants as the largest religious tradition most recently associated with higher fertility (Hackett, 2008; Hout et al., 2001; Mosher et al., 1992; Scheitle et al., 2011; Sherkat, 2014). The earlier Catholic vs. non-Catholic convergence was thought to be due to an increasing secularization among Catholics such that, once religious participation was controlled, they were becoming no different from other Americans in their fertility patterns (Westoff and Jones, 1979; Mosher and Hendershot, 1984). So too, it is likely that the observed convergence between the fertility of conservative Protestants and mainline Protestants could be due to the growing mainstreaming of evangelical Christianity in the 1970s, 80s, and 90s. Once characterized by separatism in the early to middle decades of the twentieth century—which likely preserved much of their distinctive culture including pronatalism, as it has for Mormons and the Amish—conservative Protestants began to reintegrate and engage with mainstream society from the 1970s onward (Smith, 1998; Woodberry and Smith, 1998). Not coincidentally, those cohorts who would have been in their childbearing years in the early 1970s were the first to start showing accelerated fertility declines compared to mainline Protestants (Hout et al., 2001). And while conservative Protestants still evidence a tension with broader American cultural trends on certain moral issues, scholars (e.g., Lindsay, 2007) have documented the increasing diffusion of conservative Protestants into mainstream media, business, academic institutions, and politics in the past few decades. Thus it is likely that the initial declines observed by Hout et al. (2001) that were leading conservative Protestants toward parity with mainline Protestants in their childbearing have only increased in subsequent years since their study (ending with 1998 GSS data). As a result, we expect that conservative Protestant childbearing will evidence a sharp comparative decline over previous years and cohorts, corresponding to a growing lack of subcultural particularity that formerly bolstered their fertility patterns (Smith, 1998).

Yet when we examine religious commitment and belief, we expect a different pattern. While conservative Protestants, all else being equal, are likely showing declines in their fertility, we expect those who are more deeply imbedded within their religious community and for whom theological fundamentalism still holds true, to be resisting broader declines in childbearing. Religious service attendance has long served as a central measure of religious commitment and the extent to which Americans are exposing themselves to pronatalist religious messages (Frejka and Westoff, 2008; Hackett, 2008; Heaton, 1986; Mosher et al., 1992; Pearce and Davis, 2016; Perry, 2017; Westoff and Marshall, 2010; Zhang, 2008). Along with this, a commitment to interpreting the Bible literally has traditionally been considered a key marker of theological conservatism (Hackett, 2008; Sherkat, 2014). Thus, we expect that Americans who show higher levels of institutional religious participation (attendance) and theological fundamentalism (literalism) will be declining in their fertility at slower rates than others, even when controlling for religious tradition.

Lastly, we consider the interplay between measures of religious commitment and belief with religious tradition, focusing explicitly on conservative Protestants, mainline Protestants, and Catholics. We anticipate that Americans who attend more frequently and affirm biblical literalism will evidence higher levels of childbearing for the reasons we provide above. However, we expect both measures of religious commitment to matter more for predicting trends in Catholic and mainline Protestant fertility than for conservative Protestants. This is largely because there tends to less of an emphasis on worship attendance and conservative Bible beliefs for the former groups. Frequent attendance and biblical literalism are fairly normative for conservative Protestants in the U.S. (Chaves, 2017). So much so, in fact, that some researchers actually include measures of attendance and Bible belief in their

definitions of conservative Protestantism (see Hackett and Lindsay, 2008). These religious commitments, however, tend to be more variable among Catholics and mainliners. Thus, we expect that if previous research has documented declines in conservative Protestant fertility *without* controlling for religious commitment or belief (e.g., Hout et al., 2001, but only up to 1998), those declines would likely continue even after accounting for the moderating influence of such characteristics. Conversely, frequent attendance and theological fundamentalism will likely be increasingly salient characteristics for distinguishing large numbers of nominal Catholics and mainline Protestants from those whose lives are oriented around traditionalist (and pronatalist) values and practices.

4. Methods

4.1. Data

We use data from the 1972–2016 cross-sectional GSS to explore fertility patterns across our religion measures. The GSS is a nationally representative, face-to-face survey of the non-institutionalized adult population in the US. Because we are interested in the total number of children individuals are having, we limit our sample to men and women who are 45 years old or older and therefore have likely completed their childbearing years (following Hout et al., 2001 and Sherkat, 2014; see also Schnabel, 2018).[2] After accounting for missing information, we have an analytical sample of 29,683 individuals across 44 survey years.

4.2. Measures

4.2.1. Dependent variable

Our outcome measure for this study is the total number of children ever born to respondents. The GSS asked respondents: "How many children have you ever had? Please count all that were born alive at any time (including any you had from a previous marriage)." Response categories for this measure run from 0 (respondent has no children) to 8 or more. While this variable is top coded, only around 803 (2.71%) individuals have had 8 or more children in our analytical sample. The average individual in our sample has had 2.5 children, though this has changed over time from 2.7 in 1972 to 2.3 in 2016. A bivariate analysis of childbearing trends across the general population and our key religion variables (see Appendix Fig. 2A) shows that these declines are consistent across the board, though the decline for conservative Protestants is steeper compared to the others.

4.2.2. Key independent variables

The GSS has historically collected a large amount of information about the religious lives of respondents. To capture differences in fertility rates by membership in different religious traditions, we use a modified version of the religious traditions classification scheme proposed by Steensland et al. (2000). Our modification involves decomposing the black Protestant category into the mainline and conservative Protestant categories to avoid concerns over collinearity with our racial control measures (Perry and Schleifer, 2018; Sherkat, 2014). After this modification, we have five different categories of religious affiliation (conservative Protestants, Mainline Protestants, Catholics, other religious traditions, and the religiously non-affiliated). Because we are primarily interested in conservative Protestant fertility, our earlier main models will contrast these individuals (coded 1) with everyone else (coded 0). When averaged over our time-series, around 36% of our sample reports belonging to a conservative Protestant group, though this figure has changed from 30% in 1972 to 37% in 2016.[3] In additional models, we explore how trends in fertility among mainline Protestants and Catholics compare to the conservative Protestants in our sample.

The GSS also collects information about Americans' frequency of religious service attendance, asking: "How often do you attend religious services? (0) Never, (1) Less than once a year, (2) Once a year, (3) Several times a year, (4) Once a month (5) 2–3 times a month, (6) Nearly every week, (7) Every week, and (8) More than once a week." With this information, we create a measure for those who attend religious services once a month or more (coded 1) compared to everyone else (coded 0) (following Voas and Chaves, 2016). Around 54% of Americans report attending religious services once a month or more, when average over these 44 years. This ratio has changed from 62% in 1972 to around 49% in 2016.[4]

Lastly, the GSS collects information about respondent's belief in the authority of the Bible, asking: "Which of these statements comes closest to describing your feelings about the Bible? (1) The Bible is an ancient book of fables, legends, history, and moral precepts recorded by men, (2) the Bible is the inspired word of God but not everything in it should be taken literally, word for word, and (3) the Bible is the actual word of God and is to be taken literally, word for word." Because we are primarily interested in

[2] Our cutoff of 45 + years represents a reasonable threshold to model completed fertility based on previous studies (Hout et al., 2001; Sherkat, 2014) as well as the fact that surveys like the NFSG Cycle 6 include only men and women under age 45. However, in order to test whether our results were sensitive to age-range, in ancillary analyses (available upon request) we adjusted the age range to include ages 35 +, 55 +, and 65 + years, and these yielded few substantive differences other than what might be expected given a reduction in sample size. Thus, our findings are not contingent on different age specifications.

[3] Conservative Protestant affiliation reached its peak in the GSS in 1996 and have been in decline since. Thus while the trend from 1972 to 2016 looks as though it were trending upward, conservative Protestant numbers have been steadily declining for the past 20 years of the GSS. This is consistent with Pew Research Center data (2015) also reporting a decline among conservative Protestants from 2007 to 2014.

[4] In additional sensitivity analyses (available upon request), we ran models with different cutoffs for our binary attendance measure, including respondents who attended "several times a year or more," "several times a month or more," or "nearly every week or more." The trends are essentially identical to the findings we present below using our "once a month or more" cutoff.

theological fundamentalism, we use this information to create an indicator for individuals who believe the Bible is to be taken literally (coded 1) compared to everyone else (coded 0).[5] This measure of biblical literalism was only collected from 1984 to 2016, and, occasionally, was only asked of a random subset of respondents from particular survey years. Therefore, models that include this measure have a smaller analytical sample (N = 16,457) compared to those models that do not include this variable and the time covered in these models will also be shorter. Overall, around 36% of Americans report belief in the literal bible and this percentage has changed from 44% in 1984 to 36% in 2016.

4.2.3. Control variables

The GSS also collects a wide variety of information that may be associated with individual fertility decisions and, following previous research (e.g., Ellison et al., 2018; Hackett, 2008; Westoff and Marshall, 2010; Zhang, 2008), we control for a number of these possibilities. Because men and women show different rates of religiosity, we control for gender by including an indicator for females (coded 1). There are racial differences in fertility and religiosity and we include two controls for Black and Other race individuals with whites as the comparison group. Immigration patterns, and particularly among Hispanic Catholics (Skirbeckk et al., 2010), have been shifting the American religious landscape and thus we include a measure for respondents who were born outside of the United States (coded 1).[6] Individuals who have or currently married are more likely to have children and may have more children on average compared to individuals who have never been married. We include an indicator for individuals who ever been married[7] (coded 1) to control for these differences. We include two indicators of educational attainment (those who have completed a bachelor's degree, and those who have completed an advanced degree, compared to those with no college degree) to control for educational differences in fertility. Though we have limited our sample by age, we also control for age differences by including a continuous measure of age that runs from 45 to 89 years old and older.

Finally, we account both period and cohort in separate models. To account for change over time (a period effect) we include a continuous variable for year of survey (0–44) that will capture trends across our different groups of interest. We also include a measure for cohort. Research documents a population-level trend of younger generations of (religious) Americans choosing to have children later in life, few children, or no children at all (Wuthnow, 2007). Because this is a cohort process (as opposed to a pure age effect or some particular historical period effect), we account for this potentially confounding factor to further isolate the relationships between our measures of religion and fertility. We divided up the sample into 5 year birth cohorts starting in 1881 up to 1971 (since we are only looking at Americans age 45 and over, they would have to be born in 1971 to be included in our 2016 sample).[8] Table 1 presents the descriptive statistics averaged over time for all the variables used in our analyses.

4.3. Analytical strategy

The outcome variable for our analyses is a count of total number of children an individual has ever had and therefore traditional Ordinary Least Squares models may provide inconsistent estimates of this outcome (Cameron and Trivedi, 2013). We will therefore use a dedicated count estimator to analyze these data because these approaches tend to produce more consistent estimates (Long, 1997; Long and Freese, 2014). We use negative binomial regressions instead of a Poisson approach because formal tests show that overdispersion (i.e., $var(y) \neq \mu(y)$) is present within these data. Another issue for modeling a count of children is that there is an increasing number of individuals who for various reasons never have any children. This could be a conscious decision as more Americans choose to forego childbearing, or, in the case of many religious Americans, either they delay marriage too long or cannot find a suitable religious spouse and consequently remain childless. Whatever the reason, the GSS data show that in 1972 around 23% of our sample report having no children and by 2016 this has increased to 28%. This means our data has more zeros then would be expected in a 'typical' Poisson distribution and this may bias our estimates. To overcome this issue, we utilize zero-inflated negative binomial models (Cameron and Trivedi, 2013; Long, 1997; Long and Freese, 2014) that were developed to accommodate cases in which the number of zeros (here individuals who have no children) exceed what would typically be predicted by a negative binomial regression model.

Fig. 1 visualizes how our models improve the estimation. The left cell shows the observed and predicted counts from a negative binomial regression with no predictor variables. We can see that this approach under-estimated the proportion of the population with

[5] Sensitivity analyses (available upon request) affirmed that the appropriate cutoff regarding beliefs of the Bible is indeed between the most literalist group and everyone else. Those who believe the Bible is "inspired," but not literal are no significantly different from those who believe the Bible is a book of fables in terms of their childbearing trends.

[6] Unfortunately, the GSS did not start systematically asking questions about Hispanic ethnicity until 2000, which would eliminate well over half the survey years we have available to track fertility trends. Nevertheless, we believe our measure that taps being born outside of the US provides the necessary information to sufficiently count for the potential influence of Hispanic-Catholic immigration on our fertility outcomes.

[7] The GSS asks: "Are you currently–married, widowed, divorced, separated, or have you never been married?" with the response categories: (1) "Married," (2) "Widowed," (3) "Divorced," (4) "Separated," and (5) "Never Married." With this information, we create a new measure for those who have ever been married (currently married, widowed, divorced, or separated = 1) compared to individuals who have never married (coded = 0).

[8] We code our cohort measure by subtract the age of the respondent from the year of the survey to get the year of birth. With this information, we place respondent into 5-year birth cohorts. For example, those born between 1892 and 1986 are considered a single cohort in our analyses. For the earliest cohort in these data, we include an 7-year range from 1884 to 1891 due to the small number of individuals born in these years within these data. Because we limit our sample to those 45 years old and older at the time of the survey, the oldest cohort in our sample was born between 1968 and 1972.

Table 1
Summary statistics.

	Mean	*SD*	*Min*	*Max*
Number of Children Ever Had	2.52	1.89	0	8
Religious Tradition				
Not Conservative Protestant	0.64	0.48	0	1
Conservative Protestant	0.36	0.48	0	1
Religious Service Attendance				
Not Monthly Church Attendance	0.46	0.50	0	1
Monthly Church Attendance	0.54	0.50	0	1
Attitudes toward the Bible[1]				
Not Biblical Literalist	0.64	0.48	0	1
Biblical Literalist	0.36	0.48	0	1
Sex				
Male	0.43	0.50	0	1
Female	0.57	0.50	0	1
Race				
White	0.84	0.37	0	1
Black	0.13	0.33	0	1
Other Race	0.03	0.18	0	1
Foreign Born @ age 16	0.06	0.24	0	1
Ever Married	0.93	0.26	0	1
Bachelors	0.12	0.33	0	1
Advanced Degree	0.08	0.28	0	1
Age	61.23	11.35	45	89
N	29,677			

[1] Biblical Literalist measure was only collected from 1984 to 2016. Moreover, across many of the survey waves, this information was collected only from a randomly assigned subsample of the total GSS sample for these survey years. The number of observations for this measure is 16,460.

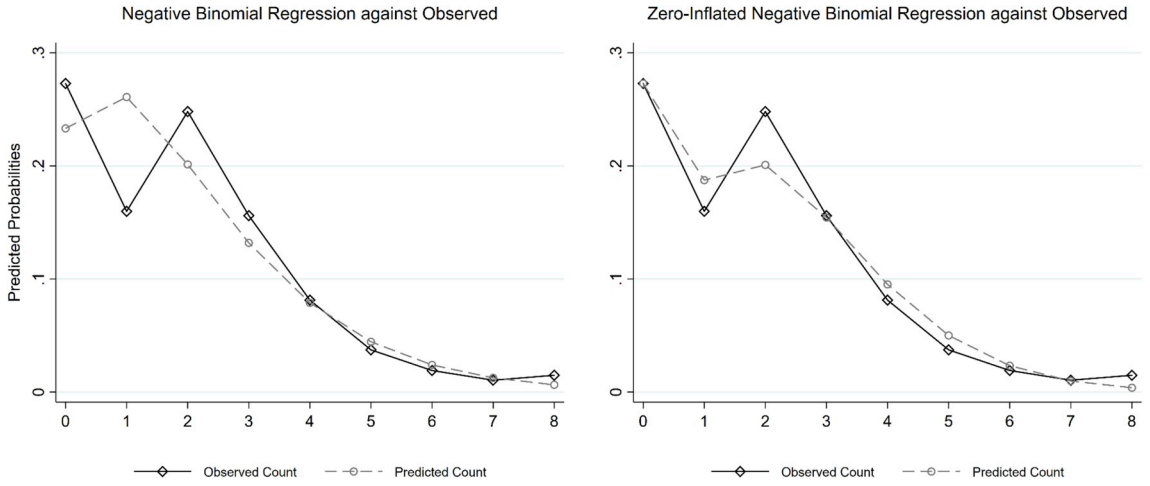

Fig. 1. Predicted against Observed Counts for two Specifications of Negative Binomial Regressions.
Source: General Social Survey, 1972–2016

no children and over-estimates the proportion with 1 child. The right cell shows the predicted and observed counts from a zero-inflated negative binomial regression. As we can see, this approach preforms better than the regression that does not account for the excess zeros. In addition, formal tests of Poisson regressions, negative binomial regressions, zero-inflated Poisson regressions, and zero-inflated negative Binomial regressions show a preference for the latter across the AIC, BIC, and tests of the likelihood ratio (results available upon request).

Zero-inflated count models assume that there are two groups present in the count data. The first group includes those individuals who are 'always 0' or those individuals who proactively chose not to have any children. These individuals have an outcome of 0 with a probability of 1. The second group may end up having no children, but there is a greater than 0 probability that these individuals will have a positive count. We cannot determine, a priori, which group individuals belong to, but we can model these processes based

on observed characteristics. This is achieved through a three-step process: first, we model membership into the "never children" group using a logistic regression model; second, we model the predicted count of children, using a negative binomial regression model; third, we produce an overall predicted count of children by combining the probabilities from step 1 and step 2.[9] For our models here, we include all the controls in both our inflation and our count models. All models were estimated in STATA 15 and we use listwise deletion to address missing information.[10]

5. Results

Table 2 presents the results from a series of zero-inflated negative binomial regression models predicting children ever born. The results are presented in two parts: first, the top half of the table shows the negative binomial regression adjusted for the excess of individuals who have no children and the second half of the table presents the corresponding logistic inflation model predicting those individuals who are expected to have no children. Each model includes the relevant key independent and control variables. The count component from Model 1 shows that, after accounting for those who are expected to never have children, conservative Protestants are expected to have a larger number of children compared to non-conservative Protestants (averaged cross all years of the GSS). In addition, monthly attenders are having more children than those who attend at lower rates. To make this more concrete, conservative Protestants are expected to have around 2.6 children while non-conservative Protestants are expected to have around 2.5, this is a 3.7% larger predicted count for conservative Protestants when averaged over these 44 years. The percent difference in expected count for monthly attenders is 8.6%. We can also see from this model that there is a significant decrease in the expected count of children across time for this sample. In 1972, the predicted count was 2.59 holding other factors constant. By 2016, this predicted count had reduced to 2.34, a 12% decrease across these 44 years.

From the inflation model, we also see some significant patterns when predicting who will never have any children. Here, a negative coefficient means that members of these groups are less likely to remain childless. We can see that monthly attenders are significantly less likely to not have children by age 45. Monthly attenders have a 0.811 lower odds ($OR = \exp(-0.21)$) relative to those who attend more frequently. Put another way, monthly attenders have a 18.8% lower odds of having no children compared to non-monthly attender. Conservative Protestants, on the other hand, are not significantly different then non-conservative Protest in terms of their odd not having children according to this model.

Model 2 expands on this basic strategy by including interactions between conservative Protestants and our year of survey variable. This decomposes the fertility trends for conservative Protestants and non-conservative Protestants in our sample. From both the count and the inflation component of this model we can see that, relative to non-conservative Protestants, conservative Protestants are declining more sharply in their fertility across these 44 years, though they are remaining more likely to have at least 1 child. In order to visualize these differences, we plot the predicted count while accounting for the excess zeros in Fig. 2. The top cell shows that the conservative Protestant and non-conservative Protestant individuals are converging in terms of their fertility rates. In 1972, conservative protestant had around 6% more predicted children then non-conservative Protestants, and by 2016 this gap had decreased to 0.58%, a statistically insignificant difference.

Models 3 and 5 follow a similar procedure and these trends are also plotted in Fig. 2. Monthly attenders (Model 3) show a relatively stable trend in the predicted number of children. In 1972, monthly attenders are predicted to have around 2.60 children, and by 2016 they are expected to have around 2.53 children, holding a number of factors constant. Non-monthly attenders, on the other hand, show decreasing fertility that maps onto population trends. For these individuals, there is a 18% decrease in the expected number of children over these 44 years. For biblical literalists (Model 5), we observe a modest decrease in the expected number of children over time, but that decrease is far less severe than non-literalists. In 1984, Americans who interpret the Bible literally were predicted to have around 2.58 children while controlling for a number of other factors. By 2016, this predicted value had reduced to 2.43, a 6% decrease. By comparison, however, those in our sample who are not literalists showed a 17% decrease in expected number of children.

Turning to our analysis of birth-cohorts, we see in Fig. 3 (corresponding models are presented in Appendix Table A1), the results are substantively identical to those in the previous analysis. Importantly, however, these trends allow us to observe that, by the most recent cohort of Americans in the survey (those born in the late 1960s and early 1970s), conservative Protestant fertility has become virtually indistinguishable from non-conservative Protestants, all else being equal.

But while religious attendance and Christian fundamentalism seem to bolster the fertility of Americans on average, do these characteristics operate the same way across Christian traditions? Ancillary analyses (see Appendix Table A2 and Figure A1) showed that biblical literalism did not appear to differentially influence the fertility declines of conservative Protestants, mainline Protestants, or Catholics differently over time. Religious attendance, however, was associated with childbearing over time for Christian traditions in profoundly different ways. Table 3 presents the results from our analyses. We can see here, among conservative Protestants, monthly religious service attendance does not effect change in expected number of children over these 44 year or the odds of

[9] See the Appendix for a more detailed exposition on these three steps. Our discussion of Zero-inflated negative binomial models closely follows Long and Freeze's (2014) explication.

[10] There are very few missing cases in these data. The variables with the largest percent missing in our analyses are our biblical literalism measure with 2.22% missing followed by attendance at 1.08%. The rest all have below 1% missing or no missing cases. Thus, the small portion of missing cases in the measures used as well as the large remaining sample give us confidence that this missing information does not bias our results in any significant way.

Table 2
Zero-inflated negative binomial regression models on number of children with trends across religiosity.
Source: General Social Survey

Zero Adjusted Negative Binomial Regression

Main Effects	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coef.[1]	(*SE*)	*Coef.*[1]	(*SE*)	*Coef.*[1]	(*SE*)	*Coef.*[1]	(*SE*)	*Coef.*[1]	(*SE*)
Conservative Protestant	0.036***	(.01)	0.089***	(.02)	0.033***	(.01)	−0.004	(.01)	−0.004	(.01)
Monthly Attenders	0.083***	(.01)	0.083***	(.01)	−0.005	(.02)	0.096***	(.01)	0.093***	(.01)
Biblical Literalists							0.058***	(.01)	−0.034	(.03)
Survey Year	−0.005***	(.00)	−0.004***	(.00)	−0.007***	(.00)	−0.007***	(.00)	−0.008***	(.00)
Interactions										
Cons. Protestant*Year			−0.002***	(.00)						
Monthly*Year					0.004***	(.00)				
Literal*Year									0.003**	(.00)
Control Variables										
Female	−0.010	(.01)	−0.010	(.01)	−0.009	(.01)	−0.029**	(.01)	−0.029**	(.01)
Black	0.155***	(.01)	0.163***	(.01)	0.157***	(.01)	0.171***	(.02)	0.173***	(.02)
Other Race	0.241***	(.02)	0.240***	(.02)	0.240***	(.02)	0.219***	(.03)	0.222***	(.03)
Foreign Born	−0.023	(.02)	−0.024	(.02)	−0.024	(.02)	0.029	(.02)	0.027	(.02)
Ever Married	0.225***	(.04)	0.230***	(.04)	0.225***	(.04)	0.174***	(.04)	0.175***	(.04)
Bachelor's Deg.	−0.179***	(.01)	−0.179***	(.01)	−0.180***	(.01)	−0.163***	(.02)	−0.162***	(.02)
Advanced Deg.	−0.206***	(.02)	−0.207***	(.02)	−0.207***	(.02)	−0.212***	(.02)	−0.209***	(.02)
Age	0.005***	(.00)	0.005***	(.00)	0.005***	(.00)	0.008***	(.00)	0.008***	(.00)

Logistic Inflation Model

Main Effects	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coef.[2]	(*SE*)	*Coef.*[2]	(*SE*)	*Coef.*[2]	(*SE*)	*Coef.*[2]	(*SE*)	*Coef.*[2]	(*SE*)
Conservative Protestant	−0.019	(.10)	0.312*	(.14)	−0.008	(.09)	0.062	(.15)	0.057	(.15)
Monthly Attenders	−0.208*	(.09)	−0.213*	(.08)	−0.055	(.14)	−0.290*	(.14)	−0.274*	(.14)
Biblical Literalists							−0.004	(.15)	0.703	(.41)
Survey Year	−0.075***	(.00)	−0.068***	(.00)	−0.069***	(.01)	−0.090***	(.01)	−0.080***	(.01)
Interactions										
Cons. Protestant*Year			−0.016**	(.01)						
Monthly*Year					−0.011	(.01)				
Literal*Year									−0.025	(.01)
Control Variables										
Female	−0.206*	(.09)	−0.191*	(.08)	−0.195*	(.09)	−0.436**	(.13)	−0.450***	(.13)
Black	−1.331***	(.32)	−0.947***	(.24)	−1.200***	(.30)	−2.063***	(.26)	−1.936***	(.27)
Other Race	−0.614	(.32)	−0.495	(.30)	−0.572	(.32)	−0.806*	(.35)	−0.742*	(.35)
Foreign Born	−0.739**	(.23)	−0.731**	(.23)	−0.700**	(.22)	−1.072***	(.30)	−1.063***	(.30)
Ever Married	−6.403***	(.25)	−6.167***	(.20)	−6.317***	(.24)	−6.975***	(.31)	−6.910***	(.30)
Bachelor's Deg.	0.404**	(.13)	0.428***	(.13)	0.403**	(.13)	0.612***	(.18)	0.609***	(.18)
Advanced Deg.	0.407**	(.16)	0.434**	(.15)	0.428**	(.15)	0.647**	(.21)	0.654**	(.22)
Age	0.067***	(.00)	0.065***	(.00)	0.067***	(.00)	0.077***	(.01)	0.076***	(.01)
N	29678		29678		29678		16457		16457	
AIC	109126		109113		109082		58755		58745	
BIC	109333		109337		109306		58963		58968	

Source: General Social Survey
Standard errors in parentheses; *$p < .05$, **$p < .01$, ***$p < .001$.
[1] Negative Binomial Regression coefficients.
[2] Coefficients from the inflation model are presented in log-odds.

having 0 children for members of this religious group. For mainline Protestants, however, we see an *increase* in the predicted number of children for those who are monthly attenders. And for Catholics, while there is no interaction effect in the negative binomial regression, we do see from the inflation model that monthly attenders who are Catholic are decreasing in their log odds of remaining childless over these 44 years.

Fig. 4 visualizes the trends captured in these models. For conservative Protestants, both monthly and non-monthly attenders are predicted to have 2.89 and 2.83 children respectively in 1972, a statistically indistinguishable difference. By 2016, each group has decreased in their predicted number of children by around 16%. For mainline Protestants, we see a lower overall fertility rate than conservative Protestants, as would be expected. We also see that mainliners who attend less than monthly show a meaningful

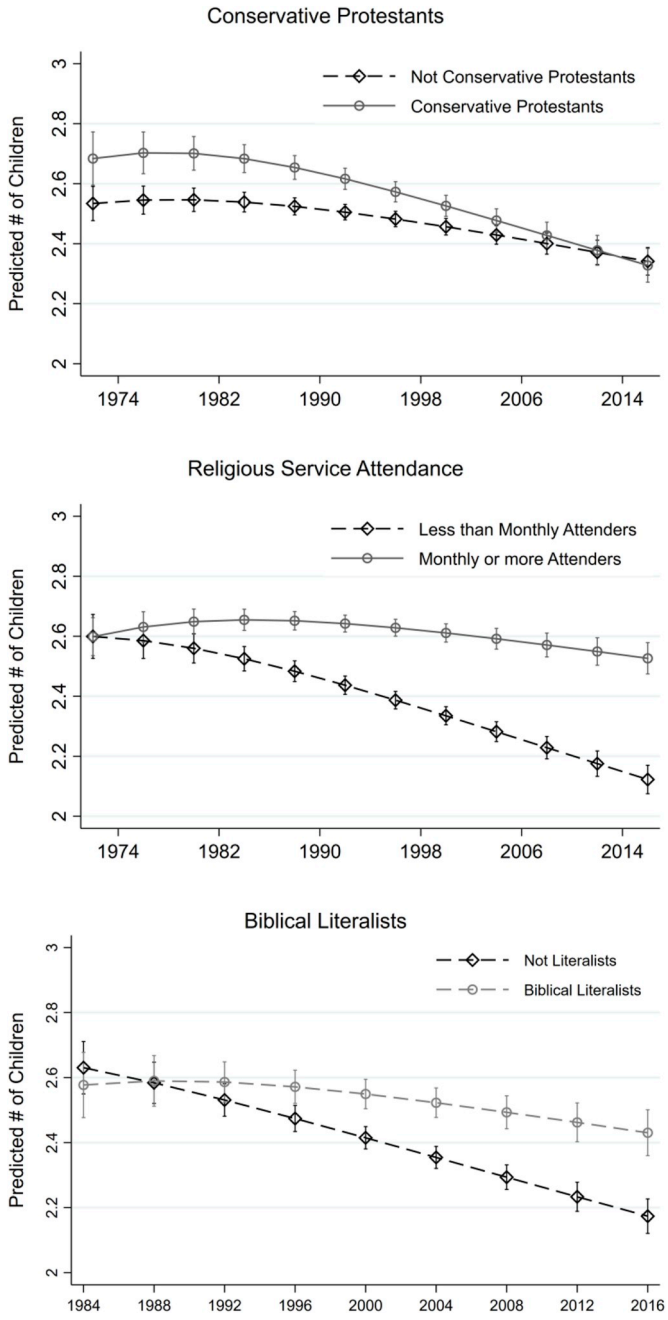

Fig. 2. Trends in Number of children Ever Had By Period.
Source: General Social Survey

decrease in fertility over this time-series. In 1972, the predicted number of children is 2.48 and by 2016 the predicted count has decreased to 2.08, a 16% decrease while controlling for several additional factors. Mainline Protestants who attend monthly or more, however, show a fairly stable fertility trend. These individuals are expected to have around 2.33 children across this time series and the trend suggests that childbearing may even increase slightly for this group. It is important to remember that this difference in fertility across religious practice for mainline Protestants is driven by the larger number of children expected from monthly attenders. We do not see a significant difference in the trend in the odds of having no children for this religious groups.

Finally, the Catholic model finds an increase in fertility for members of this community who attend religious services at least monthly. In 1972, Catholics who attended worship services monthly or more were predicted to have around 2.62 children and by 2016 this predicted count has increased 4% to 2.72 children, more in absolute terms than conservative Protestants who attend

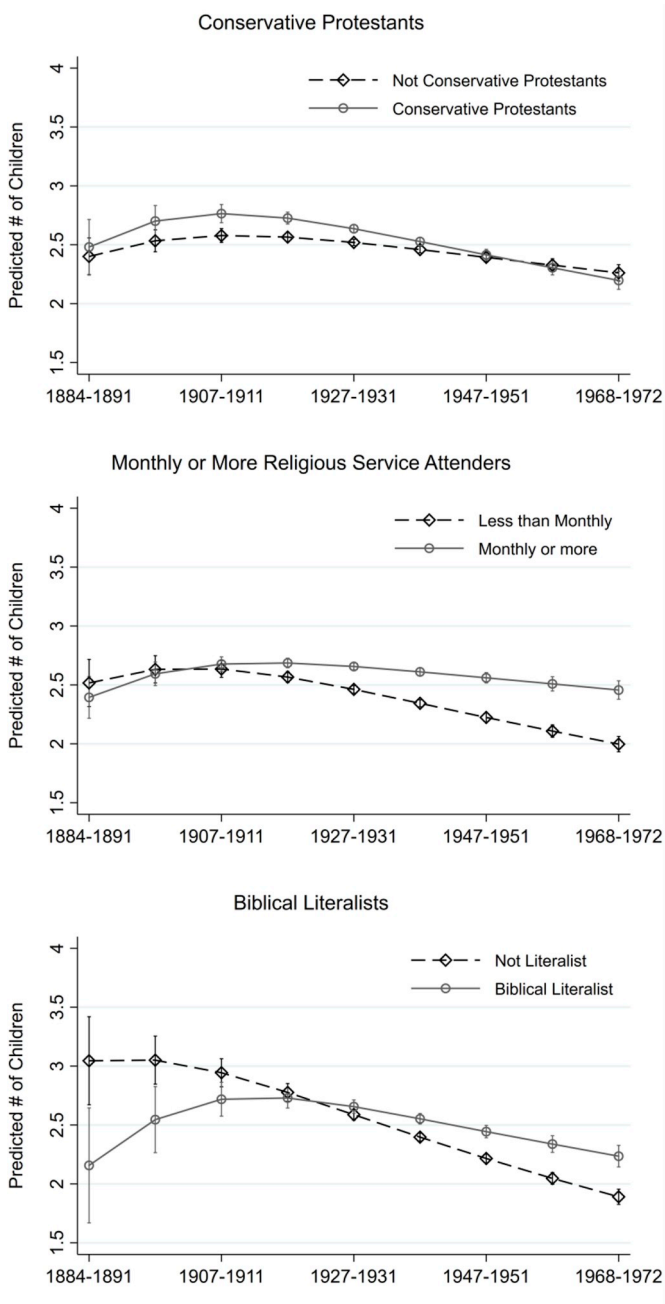

Fig. 3. Trends in Number of children Ever Had By Cohort.
Source: General Social Survey

monthly. Among Catholics who attend at lower rates, in 1972 they were predicted to have around 2.54 children and by 2016 this predicted count has decreased to 2.31, a 9% decrease.

6. Discussion and conclusions

Religious characteristics have always been important correlates of fertility attitudes and behavior. While early research emphasized substantial fertility differences across religious traditions, more recent research has argued that religious commitment and belief are now more important measures of fertility outcomes. Due to data limitations, however, that argument had not been tested over a long period of time. Moreover, it was also a mystery as to whether measures of religious commitment would influence

Table 3
Zero Inflated Negative Binomial Regression on Number of Children with Monthly Religious Service Trends across Religious traditions. Source: General Social Survey

Zero Adjusted Negative Binomial Regression						
Main Effects	Evangelicals		Mainliners		Catholics	
	Coef.[1]	(*SE*)	*Coef.*[1]	(*SE*)	*Coef.*[1]	(*SE*)
Monthly Attenders	−0.026	(.03)	−0.099***	(.03)	0.074*	(.04)
Survey Year	−0.008***	(.00)	−0.007***	(.00)	−0.005***	(.00)
Interactions						
Monthly*Year	0.002	(.00)	0.005***	(.00)	0.002	(.00)
Control Variables						
Female	0.006	(.01)	−0.010	(.02)	−0.014	(.02)
Black	0.229***	(.02)	0.102***	(.03)	−0.004	(.05)
Other Race	0.287***	(.04)	0.044	(.09)	0.266***	(.03)
Foreign Born	0.023	(.04)	−0.028	(.04)	−0.053*	(.03)
Ever Married	0.300***	(.05)	0.182*	(.09)	0.323***	(.08)
Bachelor's Deg.	−0.177***	(.03)	−0.158***	(.02)	−0.146***	(.03)
Advanced Deg.	−0.254***	(.04)	−0.180***	(.03)	−0.164***	(.04)
Age	0.006***	(.00)	0.001	(.00)	0.007***	(.00)
Logistic Inflation Model						
Main Effects	Evangelicals		Mainliners		Catholics	
	Coef.[2]	(*SE*)	*Coef.*[2]	(*SE*)	*Coef.*[2]	(*SE*)
Monthly Attenders	−0.394*	(.19)	−0.279	(.28)	0.362	(.30)
Survey Year	−0.063***	(.01)	−0.085***	(.01)	−0.079***	(.01)
Interactions						
Monthly*Year	−0.004	(.01)	0.000	(.01)	−0.008	(.01)
Control Variables						
Female	−0.284*	(.12)	0.071	(.19)	−0.059	(.17)
Black	0.049	(.14)	−3.402***	(.62)	−2.504***	(.65)
Other Race	−0.250	(.49)	−1.356	(1.61)	−0.799	(.47)
Foreign Born	−0.806	(.54)	0.862*	(.36)	−1.019**	(.35)
Currently Married	−4.787***	(.21)	−7.630***	(.45)	−6.625***	(.34)
Bachelor's Deg.	0.719**	(.22)	−0.252	(.33)	0.408	(.27)
Advanced Deg.	0.458	(.30)	−0.122	(.38)	0.645*	(.32)
Age	0.057***	(.01)	0.073***	(.01)	0.070***	(.01)
N	10707		7664		6858	
AIC	40948		27155		25448	
BIC	41130		27329		25619	

Standard errors in parentheses; *$p < .05$, **$p < .01$, ***$p < .001$.
[1] Negative Binomial Regression coefficients.
[2] Coefficients from the inflation model are presented in log-odds.

childbearing in the same way across major religious traditions. Drawing on data of men and women who had likely completed their childbearing from the 1972–2016 General Social Surveys, we have shown that conservative Protestants have been declining in their childbearing at a rate faster than other Americans to the point where their fertility is now statistically indistinguishable from other Americans, all else being equal. Monthly church attendance and biblical literalism, however, seem to bolster childbearing among Americans. Lastly, we showed that, while monthly attendance seems to either level out or even increase the childbearing outcomes of mainline Protestants or Catholics over time, conservative Protestants are declining in their predicted number of children regardless of their worship attendance. Religious commitment and belief, in other words, seem to matter for most in terms of maintaining higher fertility, but conservative Protestant childbearing seems to be declining regardless of their commitment.

Before further discussing the implications of this study, it is worth addressing some data limitations in order to qualify the findings and chart a path for future research. While we would argue that the GSS data have considerable strengths compared to other data sets, we are limited by the fact that we are using repeated cross-sectional surveys rather than a panel design. Importantly, we acknowledge that we are using the religious identities and characteristics that respondents are reporting in their forties and older to predict their childbearing behavior that happened earlier (Ellison et al., 2018; Pearce and Davis, 2016). While this is a fairly standard

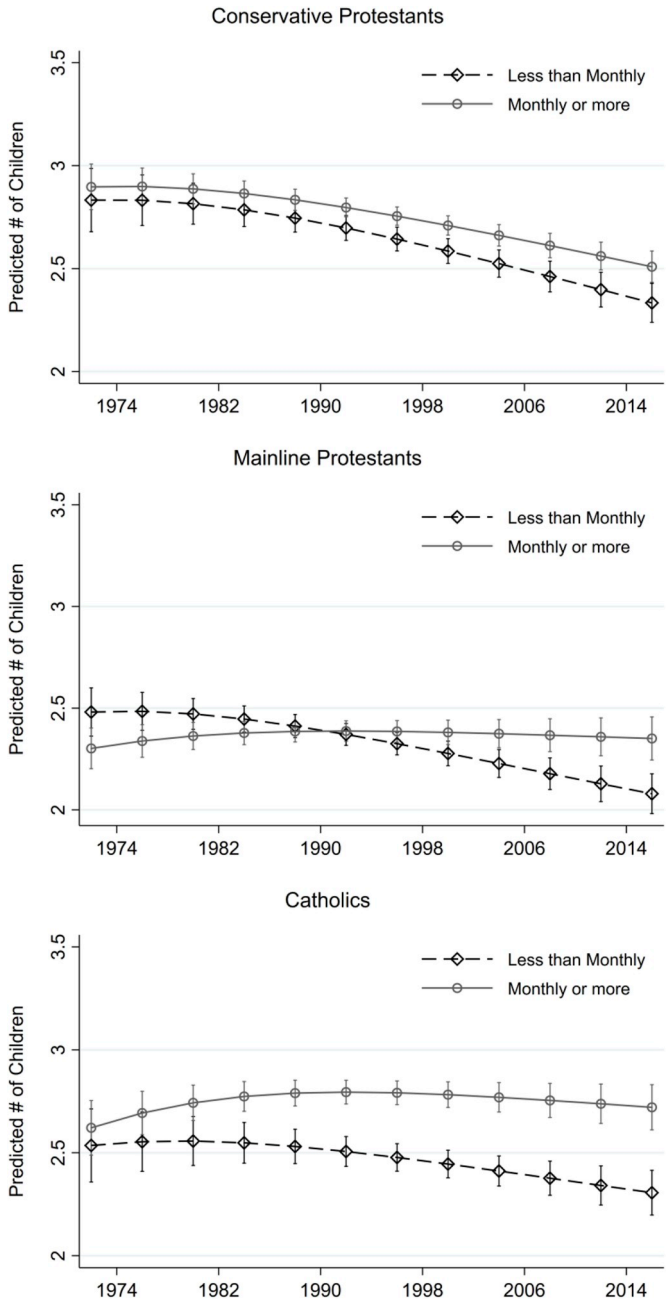

Fig. 4. Monthly religious service attendance across religious traditon.
Source: General Social Survey

practice (see Adsera, 2006; Hout et al., 2001; Schnabel, 2018; Sherkat, 2014) we acknowledge the analytical assumption we are forced to make about the continuity of Americans' religious identity and behavior over their life course. Yet previous research with panel data from both American (Pearce, 2002; Pearce and Davis, 2016; Schleifer and Chaves, 2017) and European (Berghammer, 2012) samples finds that religion is more likely to influence childbearing than the other way around. Additionally, both retrospective data (Pew Research Center, 2011) and panel data (Bengtson, 2013) show that religious characteristics are relatively stable over the life course and most Americans who experience significant religious change do so in their late teens or early twenties, before most

have had children. Thus, we feel we are on solid footing theorizing that one's religious characteristics influenced childbearing rather than vice versa. Another drawback of using repeated GSS surveys is that we are unable to explore the specific mechanisms that may connect religious characteristics like tradition, practice, or fundamentalism to childbearing outcomes (Pearce and Davis, 2016). While individual GSS surveys may ask important questions about childbearing intentions, family attitudes, or gender attitudes, which other studies show are often linked with childbearing (Ellison et al., 2018; Hayford and Morgan, 2008), these questions are either asked inconsistently or only to subsets of GSS respondents, and thus we could not incorporate them here. While we are able to accomplish our study's objectives in examining the relationships between our religion measures and childbearing over time, we agree that a broader set of controls for us to flesh out specific mechanisms would be ideal.

Despite these limitations, our study extends our knowledge of the link between religion and childbearing behavior in the United States in several important and interrelated ways. First, our work affirms what had been theorized by other studies, namely, that religious tradition has declined in its ability to predict childbearing outcomes, while measures of religious commitment and theological conservatism have become more important (Adsera, 2014; Hackett, 2008; Hayford and Morgan, 2008; Zhang, 2008). While we focus on conservative Protestants in particular, they are the major Christian tradition that has most recently been identified with higher rates of fertility compared to Catholics and mainline Protestants who had already experienced significant fertility declines. But even conservative Protestants, holding constant other factors, are no longer distinguishable from other Americans in their expected number of children, indicating that there is little about the conservative Protestant subculture (apart from their faithful practice and theological traditionalism) that makes them more pronatalist than others. Indeed, the trends observed in Fig. 2 suggest that conservative Protestants may still be declining in their fertility and may decline below that of other Americans if trends continue.

This idea gains support from our findings about religious attendance and fertility across Christian traditions. For Catholics and mainline Protestants, attending church at least monthly seemed to either completely level out or slightly increase the number of children expected for these men and women. By contrast, among conservative Protestants, for whom regular worship attendance is quite normative, their expected number of children declined regardless of their church attendance. Frequent churchgoers who were conservative Protestants show declines in their childbearing that were equally as steep and substantively indistinguishable from conservative Protestants who were infrequent churchgoers. Conservative Protestants, in other words, have not only lost their “substantial fertility advantage” (Hout et al., 2001:45) over other religious groups, but they are exhibiting a fertility decline that does not seem to vary by religious commitment like it does for Catholics and mainline Protestants. Indeed, while conservative Protestants in absolute terms still maintain higher fertility rates than mainline Protestants regardless of their attendance, conservative Protestants who attend church at least monthly have fewer children than Catholics who attend at that same frequency (see Fig. 4). Thus, while conservative Protestant losses would likely be offset by the fact that they still tend to evangelize and recruit more aggressively than mainline Protestants and Catholics (Pew Research Center, 2015; Scheitle et al., 2011) and tend to have a better retention rate than those two Christian traditions (Bengtson, 2013; Smith and Denton, 2005), our findings may portend significant future losses for conservative Protestants in the future.

An alternative explanation should be considered for the comparatively strong association between monthly attendance and fertility among Catholics and mainline Protestants over time compared to conservative Protestants. Specifically, perhaps monthly attendees among Catholics and mainline Protestants are becoming so rare that relatively higher fertility among these Americans is more reflective of an extreme and rapidly-shrinking sector of the religious landscape. Indeed, perhaps it is a statistical artifact simply reflecting rapid declines in attendance among Catholics and mainliners more than increasing fertility among those who are frequent attendees. Ancillary analyses of trends in monthly attendance and biblical literalism across Christian traditions (see Appendix Fig. 3A) shows that monthly attendance has only declined significantly among Catholics with completed fertility in the past 20 years, not mainline Protestants or conservative Protestants. Moreover, all three groups exhibit monthly attendance rates at 50% or more, indicating that those attendance patterns are not rare for any of these groups. This would suggest that the comparatively stronger influence of monthly attendance on mainline and Catholic fertility over time compared to conservative Protestants is not an artifact of numerical declines in frequent attendees among the former two groups. Rather, religious commitment has likely become a more salient cultural indicator of traditionalism and fertility for mainline Protestants and Catholics; just the opposite for conservative Protestants.

Future research certainly ought to revisit these trends in the GSS as future waves come out and a sufficient number of years have passed in order to observe significant changes in these trends. Other avenues for further study would include testing out the trends observe here with panel data that would allow for researchers to establish temporal precedence, ensuring that religious characteristics preceded childbearing behavior, such as the General Social Survey panel data or the National Longitudinal Survey of Youth. These data sets—though they would not allow researchers to cover the length of time or view cohort trends that the 1972–2016 GSS surveys can—might also contain more nuanced questions that could help researchers unpack specific mechanisms at work connecting religion to childbearing outcomes (e.g., Pearce and Davis, 2016).

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssresearch.2018.12.013.

Appendix material

Zero-inflated models are achieved through three steps.[11] The first step model membership into group A. Here $NC_i = 1$ if someone

[11] Our discussion of Zero-inflated negative binomial models closes follows Long and Freese (2014) explication.

is in the group of individuals who will never have children (group A) and $NC_i = 0$ for everyone else (group ~ A). This can be thought of as a binary process that can be modeled using logistic or probit regressions. To obtain the model probabilities, we estimate membership in group a using the following transformation of the logistic regression:

$$Pr(NC_i = 1|z_i) = \frac{\exp(\gamma_0 + \gamma_1 z_i)}{1 + \exp(\gamma_0 + \gamma_1 z_i)} = \psi_i$$

were z_i represents a vector of predictor variables – here called inflation variables because the predict some of the excess zeros in the data – and γ_1 is a vector of coefficient that captured the effects of the predictor variables on the probability of not having any children. These predicted probabilities are set to a vector – here ψ_i – so we can account for these probabilities later.

The second step in the Zero-inflated count models is to predict the count of children – including those with no children, for those in group ~ A. To achieve this, we model these individuals using a Poisson or Negative Binomial regression model. Because our data suffers from over dispersion, we use a negative binomial regression that takes the following form:

$$\tilde{\mu}_i = \exp(\beta_0 + \beta_1 x_i)\delta_i$$

were $\tilde{\mu}_i$ is the expected number of children, β_0 is the model intercept, x_i in a vector of predictor variables and β_1 the accompanying vector of coefficients, and δ_i is the exponentiation of the individual level error that is included to account for overdispersion. To capture the predicted count of children, we use the following transformation:

$$\Pr(y_i|x_i, \delta_i) = \frac{e^{-\tilde{\mu}_i}\tilde{\mu}_i^{y_i}}{y_i!}$$

$\Pr(y_i|x_i, \delta_i)$ cannot be computed because δ_i is unknown. To overcome this, we assume that δ_i has a gamma distribution (see: Cameron and Trivedi, 2013:80–89; Long, 1997:231–232; Long and Freese, 2014: 507–508).

The final step computed the predicted probability of observed counts by integrating the probabilities from step 1 and step 2. The probability of never have a child mixes the zeros from each group assumed here (group A and group ~ A):

$$\Pr(y_i = 0|x_i, z_i) = \psi_i + \{(1 - \psi_i) * \Pr(y_i = 0|x_i, NC_i = 0)\}$$

were the probability that individual have no children conditioned on the control and inflation variables ($\Pr(y_i = 0|x_i, z_i)$) is equal to the probability of being in group A (ψ_i) plus 1 minus the probability of being in group A ($1 - \psi_i$) multiplied by the probability of having zero children conditioned on the control variables and member ship in group A ($\Pr(y_i = 0|x_i, NC_i = 0)$). The probability of each count – including some 0s – is produced from the following equation:

$$\Pr(y_i = k|x_i, z_i) = (1 - \psi_i) * \Pr(y_i = k|x_i, NC_i = 0)$$

Were the probability each count conditioned on the control and inflation variables is equal to 1 minus the probability of being in group A multiplied by the probability of each count conditioned on the control variables for those in group A. For a formal treatment of the math behind this approach, see Camron and Trivedi (2013).

Table A1
Zero Inflated Negative Binomial Regression on Number of Children with Cohort Trends[1]

Zero Adjusted Negative Binomial Regression

Main Effects	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coef.[1]	(*SE*)	*Coef.*[1]	(*SE*)	*Coef.*[1]	(*SE*)	*Coef.*[1]	(*SE*)	*Coef.*[1]	(*SE*)
Conservative Protestant	0.036***	(.01)	0.136***	(.03)	0.033***	(.01)	−0.005	(.01)	−0.006	(.01)
Monthly Attenders	0.084***	(.01)	0.084***	(.01)	−0.078**	(.03)	0.097***	(.01)	0.093***	(.01)
Biblical Literalists							0.059***	(.01)	−0.112**	(.04)
Survey Year	−0.023***	(.00)	−0.019***	(.00)	−0.032***	(.00)	−0.038***	(.00)	−0.045***	(.00)
Interactions										
Cons. Protestant*Year			−0.010***	(.00)						
Monthly*Year					0.016***	(.00)				
Literal*Year									0.016***	(.00)
Control Variables										
Female	−0.010	(.01)	−0.010	(.01)	−0.009	(.01)	−0.029**	(.01)	−0.029**	(.01)
Black	0.152***	(.01)	0.162***	(.01)	0.153***	(.01)	0.170***	(.02)	0.172***	(.02)
Other Race	0.240***	(.02)	0.238***	(.02)	0.239***	(.02)	0.219***	(.03)	0.221***	(.03)
Foreign Born	−0.023	(.02)	−0.024	(.02)	−0.025	(.02)	0.029	(.02)	0.025	(.02)
Ever Married	0.225***	(.04)	0.230***	(.04)	0.226***	(.04)	0.176***	(.04)	0.178***	(.04)
Bachelor's Deg.	−0.180***	(.01)	−0.180***	(.01)	−0.182***	(.01)	−0.164***	(.02)	−0.161***	(.02)

(*continued on next page*)

Table A1 (*continued*)

Zero Adjusted Negative Binomial Regression

Main Effects	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coef.[1]	(*SE*)	*Coef.*[1]	(*SE*)	*Coef.*[1]	(*SE*)	*Coef.*[1]	(*SE*)	*Coef.*[1]	(*SE*)
Advanced Deg.	−0.207***	(.02)	−0.208***	(.02)	−0.209***	(.02)	−0.213***	(.02)	−0.208***	(.02)

Logistic Inflation Model

Main Effects	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coef.[2]	(*SE*)	*Coef.*[2]	(*SE*)	*Coef.*[2]	(*SE*)	*Coef.*[2]	(*SE*)	*Coef.*[2]	(*SE*)
Conservative Protestant	−0.020	(.10)	0.466*	(.19)	−0.007	(.10)	0.059	(.15)	0.062	(.14)
Monthly Attenders	−0.204*	(.09)	−0.204*	(.08)	−0.029	(.19)	−0.287*	(.14)	−0.262	(.14)
Biblical Literalists							0.001	(.15)	1.101**	(.41)
Survey Year	−0.331***	(.02)	−0.303***	(.02)	−0.318***	(.03)	−0.375***	(.04)	−0.328***	(.04)
Interactions										
Cons. Protestant*Year			−0.053**	(.02)						
Monthly*Year					−0.029	(.02)				
Literal*Year									−0.105**	(.04)
Control Variables	Model 1		Model 1		Model 1		Model 1		Model 1	
	Coef.[2]	(*SE*)	*Coef.*[2]	(*SE*)	*Coef.*[2]	(*SE*)	*Coef.*[2]	(*SE*)	*Coef.*[2]	(*SE*)
Female	−0.205*	(.09)	−0.191*	(.08)	−0.194*	(.09)	−0.436**	(.13)	−0.469***	(.13)
Black	−1.414***	(.33)	−0.965***	(.24)	−1.297***	(.32)	−2.066***	(.26)	−1.868***	(.26)
Other Race	−0.652*	(.32)	−0.507	(.30)	−0.620	(.32)	−0.804*	(.35)	−0.699*	(.35)
Foreign Born	−0.726**	(.23)	−0.726**	(.23)	−0.678**	(.22)	−1.046***	(.29)	−1.038***	(.29)
Ever Married	−6.451***	(.25)	−6.165***	(.21)	−6.374***	(.25)	−6.961***	(.31)	−6.814***	(.30)
Bachelor's Deg.	0.398**	(.13)	0.429***	(.13)	0.395**	(.13)	0.613***	(.18)	0.609***	(.18)
Advanced Deg.	0.402*	(.16)	0.434**	(.15)	0.424**	(.16)	0.654**	(.21)	0.677**	(.22)
N	29678		29678		29678		16457		16457	
AIC	109145		109130		109096		58776		58746	
BIC	109352		109354		109320		58985		58969	

Standard errors in parentheses; *$p < .05$, **$p < .01$, ***$p < .001$.

[1] Negative Binomial Regression coefficients.

[2] Coefficients from the inflation model are presented in log-odds.

Table A2
Zero Inflated Negative Binomial Regression on Number of Children Ever Had with Religiosity Trends across Belief in Literal Bible

Zero Adjusted Negative Binomial Regression						
Main Effects	Evangelicals		Mainliners		Catholics	
	Coef.[1]	(*SE*)	*Coef.*[1]	(*SE*)	*Coef.*[1]	(*SE*)
Biblical Literalists	0.046	(.05)	−0.038	(.08)	−0.072	(.08)
Monthly Attenders	0.029	(.02)	0.010	(.02)	0.113***	(.02)
Survey Year	−0.008***	(.00)	−0.006***	(.00)	−0.008***	(.00)
Interactions						
Literalists *Year	0.000	(.00)	0.004	(.00)	0.004	(.00)
Control Variables						
Female	−0.032	(.02)	−0.038	(.02)	−0.026	(.02)
Black	0.228***	(.02)	0.196***	(.04)	0.032	(.06)
Other Race	0.283***	(.05)	0.174	(.10)	0.238***	(.04)
Foreign Born	0.084	(.05)	−0.038	(.06)	−0.014	(.03)
Ever Married	0.188***	(.06)	0.349**	(.12)	0.253**	(.09)
Bachelor's Deg.	−0.151***	(.03)	−0.146***	(.03)	−0.139***	(.03)
Advanced Deg.	−0.247***	(.04)	−0.183***	(.04)	−0.164***	(.04)
Age	0.009***	(.00)	0.005***	(.00)	0.010***	(.00)
Logistic Inflation Model						
Main Effects	Evangelicals		Mainliners		Catholics	
	Coef.[2]	(*SE*)	*Coef.*[2]	(*SE*)	*Coef.*[2]	(*SE*)
Biblical Literalists	1.101*	(.54)	−0.922	(1.22)	−0.044	(.87)
Monthly Attenders	−0.330	(.18)	−0.333	(.39)	−0.052	(.29)
Survey Year	−0.052**	(.02)	−0.134***	(.03)	−0.121***	(.02)
Interactions						
Literalists *Year	−0.030+	(.02)	0.045	(.04)	−0.009	(.03)
Control Variables						
Female	−0.707***	(.18)	0.294	(.41)	−0.163	(.28)
Black	−0.710**	(.26)	−5.193***	(1.42)	−2.240**	(.69)
Other Race	−0.547	(.57)	1.112	(1.76)	−0.843	(.55)
Foreign Born	−1.036	(.58)	1.052	(.75)	−1.246*	(.48)
Ever Married	−5.339***	(.35)	−8.564***	(.84)	−7.855***	(.63)
Bachelor's Deg.	0.607*	(.28)	−0.003	(.54)	0.705	(.40)
Advanced Deg.	0.549	(.41)	0.187	(.59)	1.500***	(.45)
Age	0.070***	(.01)	0.087***	(.02)	0.093***	(.02)
N	6157		3621		3826	
AIC	22766		12329		13913	
BIC	22948		12490		14082	

Source: General Social Survey
Standard errors in parentheses; *$p < .05$, **$p < .01$, ***$p < .001$.
[1] Negative Binomial Regression coefficients.
[2] Coefficients from the inflation model are presented in log-odds.

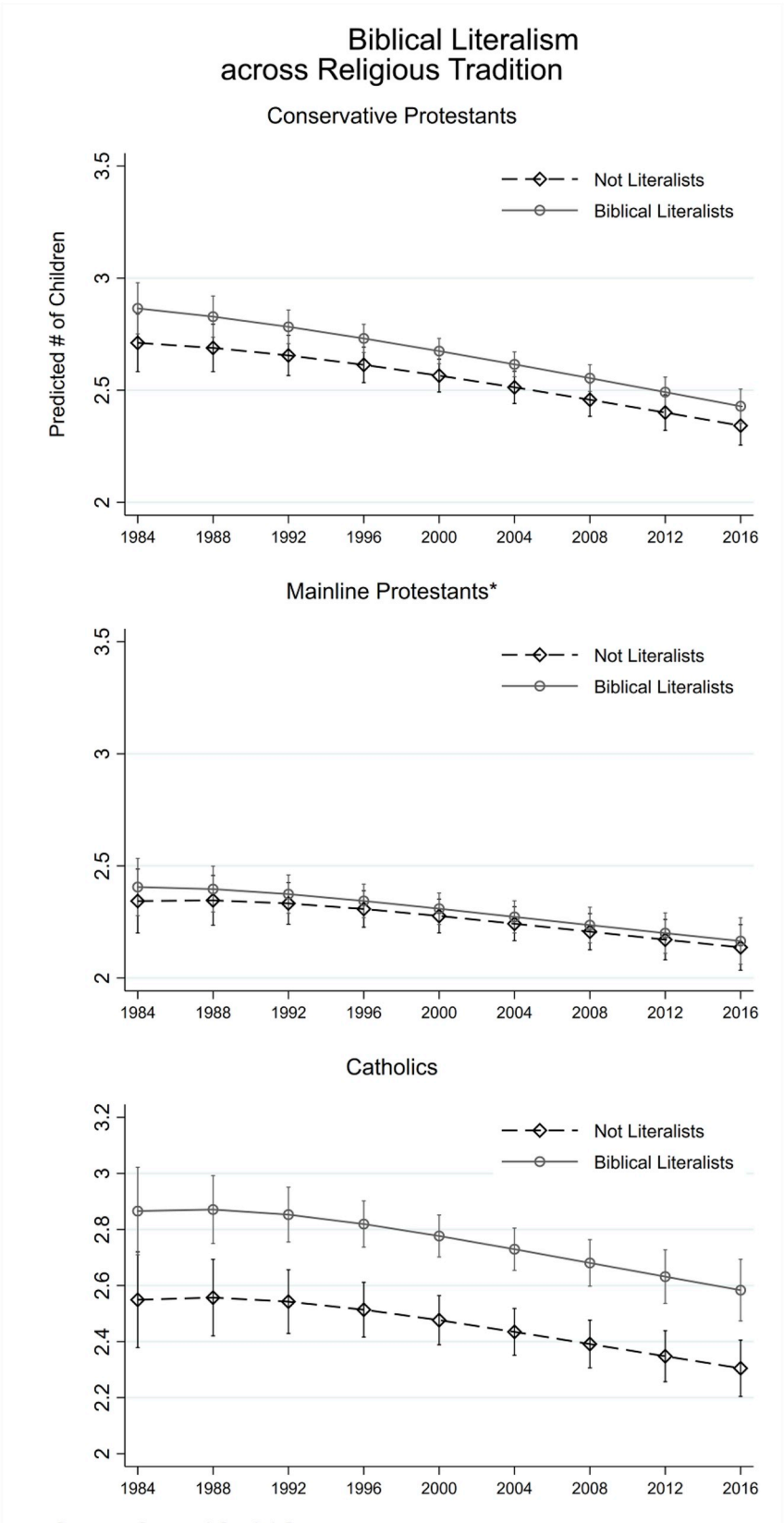

Fig. 1A. Biblical Literalism across Religious Tradition.
Source: General Social Survey.

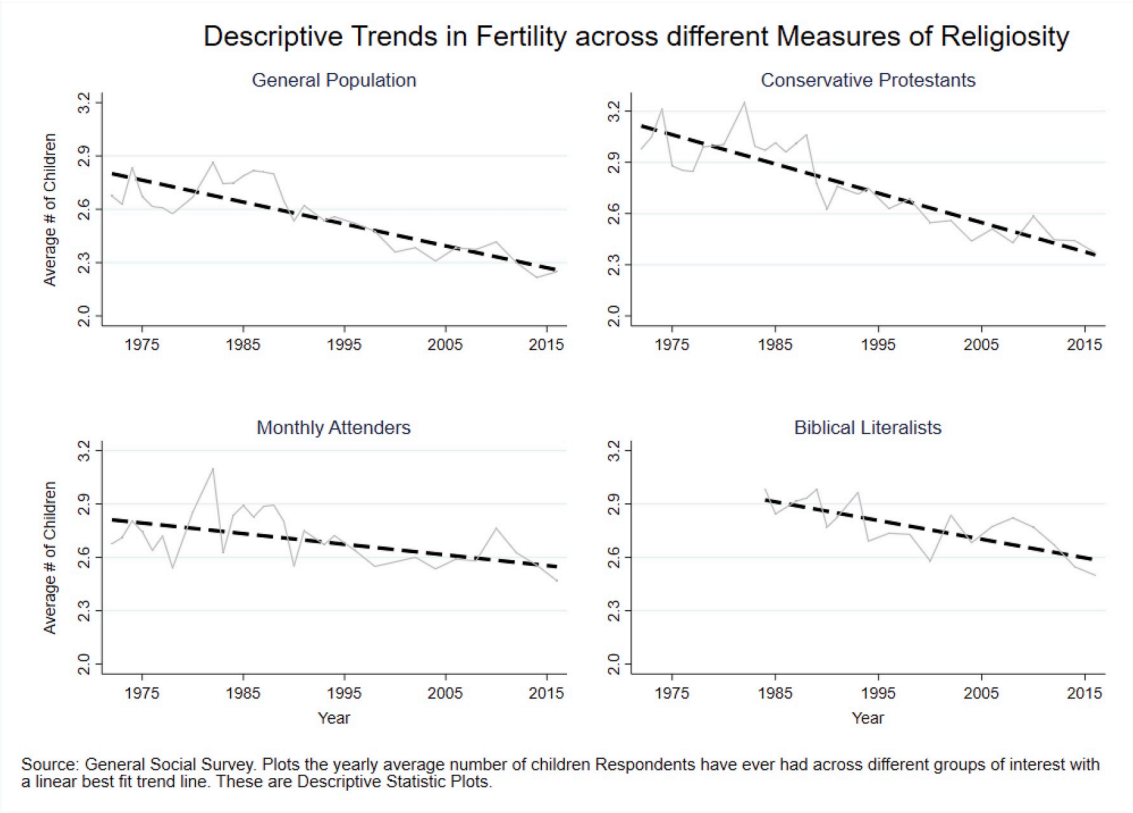

Fig. 2A. Descriptive Trends in Fertility across different Measures of Religiosity.
Source: General Social Survey. Plots the yearly average number of children Respondents have ever had across different groups of interest with a linear best fit trend line. These are Descriptive Statistics Plots.

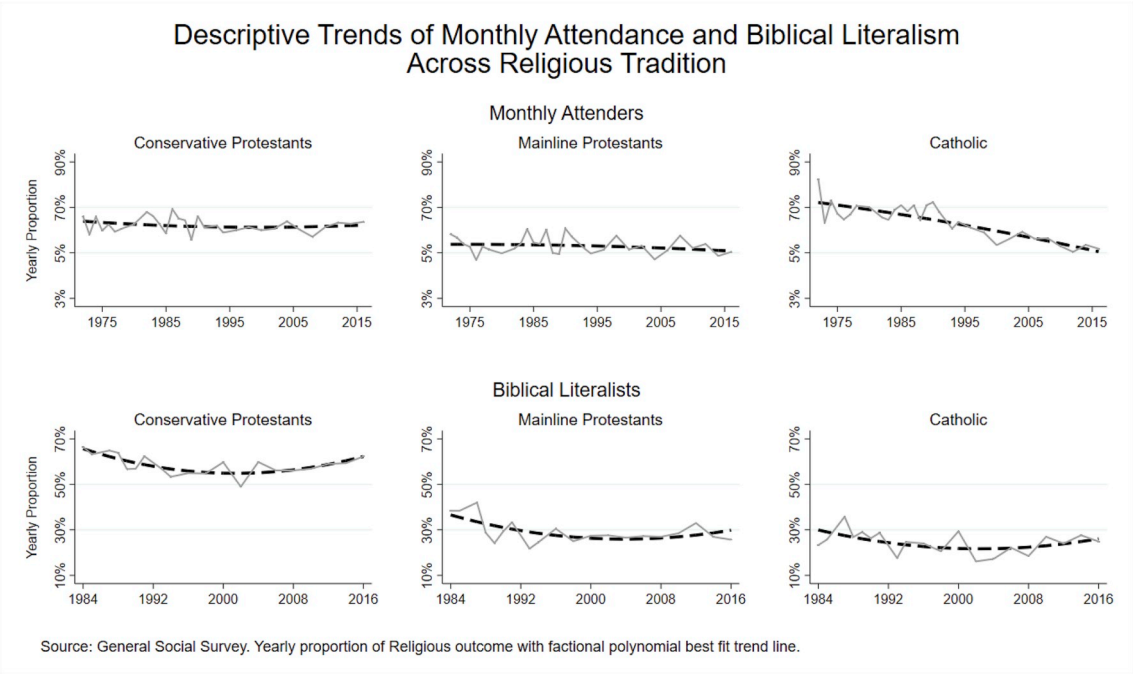

Fig. 3A. Descriptive Trends of Monthly Attendance and Biblical Literalism Across Religious Tradition.
Source: General Social Survey.Yearly Proportion of Religious outcome with factional polynomial best fit trend line.

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