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Age, Period, and Cohort Effects on U.S. Religious Service Attendance: The Declining Impact of Sex, Southern Residence, and Catholic Affiliation

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I use repeated, cross-sectional data from 1972 to 2006 to analyze age, period, and cohort effects on Americans' frequency of religious service attendance with cross-classified, random-effects models. The results show that the frequency of religious service attendance is relatively stable, with a modest period-based decline in the 1990s and little overall cohort effect. Although aggregate rates of attendance are stable, there are large changes across cohorts and periods in differences in attendance between men and women, southerners and non-southerners, and Catholics and mainline Protestants. These results serve as a reminder that aggregate trends can mask substantial changes among specific groups, and that factors that strongly influence religious participation at one period or among one birth cohort may not be the same factors that affect participation at another time or among another cohort.

Key words: Religious service attendance; Cohort; Period; Age; Sex; South.

Aside from a decline in Catholics' attendance in the 1960s and early 1970s, it appears that rates of religious service attendance in the United States are relatively stable over the last few decades (Greeley 1989; Hout and Greeley 1987, 1998; Presser and Chaves 2007). There is, however, still much debate concerning potential variations in frequency of religious service attendance by birth cohort. Stable rates of service attendance at the aggregate do not necessarily translate into stable rates of attendance across birth cohorts. Miller and Nakamura (1996), for example, argue that the disproportionately large baby-boom generation is masking a decline in attendance because

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baby boomers are attending more frequently as they age, thereby driving up the average level of attendance. While some researchers conclude that service attendance declines across birth cohorts (e.g., Chaves 1989, 1991; Sasaki and Suzuki 1987), others assert that there are no cohort effects on service attendance (e.g., Greeley 1989; Hout and Greeley 1987). Much of this disagreement stems from methodological problems with modeling cohort and period effects (Firebaugh and Harley 1991). Fortunately, recent methodological advancements can be used to address these problems. Yang and Land (2006, 2008) demonstrate that with repeated, cross-sectional data, cross-classified, random-effects models (CCREMs) overcome the major obstacles to modeling cohort and period effects. The first goal of this article is to update previous analyses of changes in religious service attendance by using up-to-date survey data spanning more than three and a half decades and by disentangling age, period, and cohort effects with CCREMs.

I also examine the changes in the impact of key predictors of religious service attendance across birth cohorts and time periods. I argue that the effects of key predictors of service attendance change across cohorts and/or across periods in response to changes in the social and cultural implications of demographic attributes. In particular, the changes in sex roles, in the southern population, and in the Catholic community may influence the impact of sex, geography, and religious tradition on service attendance. The second goal of this article is to explore cohort and period variations in the effects of Catholic affiliation, sex, and southern residence on the frequency of religious service attendance. I use 1972-2006 General Social Survey (GSS) data to analyze age, period, and cohort effects on service attendance and also across-cohort and across-period changes in the effects of key predictors of service attendance. I also examine how compositional changes across birth cohorts affect the results. I conclude with a summary of the results and with a discussion of other demographic characteristics—specifically education and race/ethnicity—that have an increasing influence on religious service attendance due to changes in the distribution of these characteristics.

Period and Cohort Effects on Religious Service Attendance

Changes in rates of religious service attendance can occur across periods and/or birth cohorts, or not at all. Period refers to a specific time point, such as a year or decade, and period effects are changes among people of all ages from one period to another period. Birth cohort refers to a group of people who are born at about the same time, and cohort effects are changes across these groups, regardless of age. The distinction between period effects and cohort effects reflects causal arguments related to social change. Are changes over time due to changes in the activities and perspectives of all relevant people, or to younger generations acting and viewing the world differently than older generations? Religious service attendance, in particular, can decline or rise over time due to some relevant event or large-scale change in perspective (period effect). For instance, it is possible that the sex-abuse scandals in-

volving Catholic priests led to a decline in attendance of Catholics for all ages; or that the political mobilization of evangelical Protestants led to a rise in attendance for evangelical Protestants of all ages. On the other hand, frequency of service attendance can decline or rise across successive birth cohorts (cohort effect). Birth cohorts are distinguished by maturing within a distinct historical era, by specific socialization influences, and by variation in the content of education (Ryder 1965). These cohort differences can result in changes in attachment to religious institutions and changes in rates of religious service attendance across generations. Well-established correlates of religious service attendance, such as geographic mobility, often vary by birth cohort, which could produce across-cohort changes in rates of service attendance (Chaves 1989).

Potential period and/or birth cohort effects on religious service attendance are central to secularization theories and theories of religious change in modern societies. Individual-level secularization theories, for example, predict a decline in attendance across cohorts (Chaves 1989; Sasaki and Suzuki 1987). These theories point to increases in urbanization, industrialization, and rationalization as well as a waning emphasis on community and religious authority as sources of the decline in religious participation (Sasaki and Suzuki 1987). Rather than all people declining in their frequency of religious service attendance over time, individual-level secularization theories tend to predict that each successive generation of Americans will attend services less often than the previous generation. Similarly, theories of religious change suggest that modernity is associated with less attachment to religious institutions. Aspects of modernity, such as middle-class lifestyles and greater levels of education, lead to religious individualism or the privatization of religion (Bellah et al. 1985). Religion, it is argued, is becoming increasingly “anchored in the personal realm” in the contemporary United States (Roof and McKinney 1987:33). From this perspective, religious service attendance should decline over time or across cohorts, regardless of levels of individual religious belief or religious salience.

Methodologically, the main obstacle to isolating cohort and period changes is the “identification problem” in age-period-cohort analyses (Firebaugh 1997). This problem arises from the dependency between age, year of survey (period), and year of birth (cohort). When age, period, and cohort intervals are based on the same length of time (e.g., one year), $\text{cohort} = \text{period} - \text{age}$. This linear dependency is problematic for the simultaneous modeling of age, period, and cohort effects; and the effects of cohort cannot reliably be estimated without including age in the model. Researchers have chosen a variety of ways to avoid the identification problem in analyses of service attendance. Most commonly, they drop age, period, or cohort from the model and make assumptions about the results, or they artificially constrain the variation in age, period, and/or cohort (Firebaugh and Harley 1991). The modeling problems associated with the dependency between age, period, and cohort have led to considerably different views of the impact of periods and cohorts on Americans’ service attendance. For instance, while Chaves (1989: 476) finds that “[e]very successive cohort coming of age since about 1940 attend church less often than the cohort before

it,” Firebaugh and Harley (1991:488) argue that the across-cohort decline identified by Chaves reflects “lifecycle effects repeated in one birth cohort after another.” Similarly, Greeley (1989:54) contends, “there is no cohort effect on American church attendance”, whereas Miller and Nakamura (1996:282) conclude, “Post-WWII cohorts attend church far less frequently than their predecessors.”

In the analysis below, I overcome the major methodological problems with age-period-cohort analyses with the use of CCREMs of frequency of religious service attendance. CCREMs use overlapping level-2 units of analysis in a multilevel model. In this case, individuals are the level-1 unit of analysis, whereas periods and cohorts operate as rows and columns in a matrix producing cohort-by-period cells, which are the level-2 unit of analysis. As Yang and Land (2006) demonstrate, CCREMs adjust for the dependency between age, period, and cohort by treating cohort and period as cross-classified level-2 units. Additionally, random-effects models are more statistically efficient than fixed-effects models when using unbalanced data that contains an unequal number of respondents in cohort-by-period cells (Yang and Land 2008).¹ With this technique, the effect of age is modeled separately for each cohort-by-period cell, and random effects gauge variation across cohorts and periods. The results provide estimates of the effect of each cohort (averaged over periods and controlling for age) and the effect of each period (averaged over cohorts and controlling for age) on religious service attendance. The specific models employed in the analysis are discussed in further detail below. The first contribution of this article is to update previous age-period-cohort analyses of service attendance using a more suitable analysis technique.

Cohort and Period Changes in the Effects of Sex, Region, and Catholic Affiliation

Not only might rates of service attendance vary across birth cohorts or time periods, but the impact of key predictors of service attendance may also differ by cohort or period. Social, cultural, and demographic variation by period and/or birth cohort can alter the impact of factors that influence religious service attendance from one birth cohort to another or from one time period to another. Factors that strongly influence service attendance among one cohort or in one period may have little effect on another cohorts’ attendance or in another time period due to the changes in the meaning associated with specific attributes. I focus on cohort and period changes in the effects of sex, southern residence, and Catholic affiliation on religious service attendance.

¹Employing different variables from the same data set I used in the analysis below, Yang and Land (2008:318) find that “the CCREM has the advantages of smaller standard error estimates for the Level 1 coefficients and a better model fit [than the fixed-effects model].”

Living in the southern United States is traditionally associated with high levels of religious service attendance. Sociologists of religion argue that there is greater normative pressure to participate in religious institutions in the South than in the rest of the nation. For instance, using 20 years of aggregated survey data, Hunt and Hunt (2001) find that rates of service attendance are considerably higher in the South than in the North. These authors point to a cultural emphasis on service attendance in the South, particularly in the rural South. Demographic changes in the South, however, may alter the service attendance patterns in the South. The population in the southern United States is rapidly increasing (Perry and Mackun 2001), and this population growth is heavily influenced by migration to the South from other areas of the nation (U.S. Census Bureau 2003). As the southern population changes, do southerners continue to attend religious services at a disproportionately high rate? In other words, is the influx of nonsoutherners diluting the cultural emphasis on religious participation in the South?

The impact of Catholic affiliation on service attendance may also vary by cohort or by period. Although Catholics' attendance declined in the 1960s and early 1970s, research suggests that there has been no change since the middle of the 1970s (e.g., Greeley 1989; Hout and Greeley 1987). Updating this line of research with a more appropriate analysis technique, however, might show additional declines in the Catholic attendance rate across periods or cohorts (relative to mainline Protestants).² Demographic and religious changes in the Catholic community support this proposition. The Catholic Church once played a more central role in the lives of American Catholics. "National" parishes served the religious needs of Irish, Italian, and Polish immigrants in the first half of the twentieth century (Orsi 1985; Shaw 1991). While "ethnic" churches continue to cater to Latino immigrants (Levitt 1998; Odem 2004), white, non-Latino Catholics now place less emphasis on the importance of the Church (D'Antonio et al. 1996; Davidson et al. 1997). Similarly, while regular Mass attendance was once the norm in the Catholic community, this is no longer the case (Davidson and Williams 1997). Young Catholics in particular are now unlikely to attend Mass on a regular basis, with Catholic teenagers attending religious services considerably less often than evangelical Protestants, black Protestants, Jehovah's Witness, and Mormon teenagers (Smith et al. 2002). Together, these trends suggest across-cohort and/or across-period declines in the positive effect of Catholic affiliation on service attendance, relative to mainline Protestants.

²I refer to Catholics' attendance in relation to mainline Protestants' attendance because I use mainline Protestants as the reference category for religious tradition. If I were to use evangelical Protestants as the reference category, I would instead propose that Catholics' attendance declines in relation to evangelical Protestants' attendance.

Finally, the traditionally large differences in service attendance between men and women may be declining. Social scientists have long known that on average women attend religious services more often than men (e.g., Yinger 1970). Changes in women's roles in American society, however, may affect religious service attendance differences between men and women. Higher levels of religious participation among women in the United States are generally attributed to the "relegation of men to the public sphere and of both women and religion to the private sphere" (Sullins 2006:838). Thus, as more women enter the public sphere by attaining college degrees and entering the workforce, the sex effect on service attendance is likely to diminish (Woodhead 2008). Previous research supports this proposition, demonstrating, for instance, that sex differences in religious service attendance are relatively small among those with full-time employment (Gee 1991). The increasing proportion of women in the workforce and women with college degrees suggests that sex effects on service attendance may be declining. In sum, in addition to analyzing age, period, and cohort effects on service attendance, this article examines cohort and period changes in the effects of sex, southern residence, and Catholic affiliation on religious service attendance.

Data

I use cumulative GSS data to analyze variations in religious service attendance. The GSS was administered annually or biennially from 1972 to 2006, producing 26 surveys. Each GSS survey employs a nationally representative sample of non-institutionalized adults in the United States (Davis et al. 2007). Respondents born before 1900 and after 1979 are deleted from the sample due to the small number of cases in these cohorts. After deleting cases with missing data, the resulting sample size is 40,795.

The level-2 unit of analysis is cohort-by-period cells, as discussed above. Sample size and the goal of creating distinctions detailed enough to identify meaningful patterns of change determine the coding of birth cohort. I use 10-year birth cohorts: 1900-1909, 1910-1919, 1920-1929, 1930-1939, 1940-1949, 1950-1959, 1960-1969, and 1970-1979. Each survey year is a separate period.

The dependent variable is the estimated number of days of religious service attendance per year. I estimate number of days attending per year with the categorical GSS religious service attendance measure. Respondents are asked how often they attend religious services, with the following response options: never, less than once a year, once a year, several times a year, once a month, two to three times a month, nearly every week, every week, and more than once a week. Other researchers have used this categorical variable to compute weekly service attendance rates (e.g., Presser and Chaves 2007). Similarly, I recode the categorical variable into a continuous variable that measures days attending religious services per year, ranging from zero to 104. The dependent variable is coded as follows: zero for never attending, 0.5 for less than once a year, one for once a year, five for several times a year, 12 for once

a month, 30 for two to three times a month, 45 for nearly every week, 52 for every week, and 104 for more than once a week. Although categorical measures of attendance are often used as dependent variables in linear regression, this recoding is more in accordance with the assumptions of linear regression.³

The independent variables measure age, sex, geographic region, religious tradition, education, income, race, marital status, children in the home, and urbanity. The GSS codes age in years of age, from 18 to 88. Respondents who are over 88 years old are grouped into one category. To avoid potential problems with this pooling of data (Ploch and Hastings 1994), respondents over 88 years of age are deleted from the sample. Preliminary analyses reveal nonlinear effects of age (Hout and Greeley 1987). To adjust for problems of collinearity between age and age-square, age is centered on the mean of age. Employing the religious tradition divisions proposed by Steensland et al. (2000), I divide respondents into mainline Protestant, evangelical Protestant, black Protestant, Catholic, Jewish, other religion, and no religion categories. Regression models include dummy variables for each religious tradition, with mainline Protestant as the reference category. I measure region with a dummy variable for the South census region and sex with a dummy variable for female respondents. Two continuous variables measure social status: education is coded as years of education (zero to 12) and income is family income in 1986 dollars.⁴ The following dummy variables are also included in the models: African American and "other race" (with white as the reference category), married, children under 18 years old in the home, and urban (100 largest SMSAs), suburban (suburb of 100 largest SMSAs), and rural (with "other urban" as the reference category).

Analysis Technique

I use linear CCREMs to analyze age, period, and cohort effects on religious service attendance. I present three models. The first model includes only age and age-square as fixed effects. This model measures the overall effects of age, period, and cohort on service attendance. The second model includes measures of sex, southern residence, Catholic affiliation, affiliation with a variety of other religious traditions, and other control variables. In the final model, the effects of sex, Catholic affiliation, and southern residence are permitted to vary across cohorts and periods. In addition to providing random cohort and period effects, CCREMs allow for random effects of independent variables, which I use to test for across-cohort and across-period variation in the effects of key independent variables. Cohort- and period-specific random-effects coefficients indicate the nature of potential across-cohort and across-period

³Identical analyses to those presented in this article using the original categorical attendance variable show similar results.

⁴The log of income is used to limit heteroscedasticity (Krueger et al. 2003).

changes in the effects of sex, southern residence, and Catholic affiliation on service attendance.⁵ To ensure that across-cohort changes do not reflect age variations in the effects of these three variables, interaction terms between age and sex, age and southern residence, and age and religious affiliation are included in the third model. All continuous variables are centered on the overall mean. The full individual or level-1 equation is as follows:

$$\text{Religious service attendance}_{ijk} = \beta_{0jk} + \beta_1 A_{ijk} + \beta_2 A_{ijk}^2 + \beta_3 F_{ijk} + \beta_4 S_{ijk} + \beta_5 C_{ijk} + \sum_{p=20}^P \beta_p X_p + e_{ijk} \quad (1)$$

Each individual (i) is nested in both a birth cohort (j) and a period (k), β_{0jk} is the intercept or cell mean for respondents in cohort j and period k , β_1 through β_5 are the individual-level fixed effects for age (A), age-square (A^2), sex (F), southern residence (S), and Catholic affiliation (C), e_{ijk} is the individual-level error term, and bp represents other individual-level fixed effects such as additional religious affiliations, interactions with age, and control variables. The level-2 model is as follows:

$$\beta_{0jk} + \gamma_0 + u_{0j} + v_{0k} \quad (2.1)$$

$$\beta_{3jk} + \gamma_3 + u_{3j} + v_{3k} \quad (2.2)$$

$$\beta_{4jk} + \gamma_4 + u_{4j} + v_{4k} \quad (2.3)$$

$$\beta_{5jk} + \gamma_5 + u_{5j} + v_{5k} \quad (2.4)$$

In Equation (2.1), γ_0 is the model intercept, which is the overall mean of service attendance, and u_{0j} and v_{0k} are the residual random effects of cohort and period, respectively. The cell mean (β_{0jk}) is equal to the sum of the overall mean or intercept (γ_0), the residual random effect of cohort j (u_{0j}), and the residual random effect of period k (v_{0k}). Using these residual random effects, I examine the effect of each cohort (averaged across all periods) and the effect of each period (averaged across all cohorts) on religious service attendance.

⁵Another reason for using CCREMs is the prohibitively large number of interaction terms that would be required to analyze cohort and period changes in the effects of these independent variables in a fixed-effects model.

Equations (2.2)-(2.4) test for random effects of sex, southern residence, and Catholic affiliation across cohorts and periods— γ_3 , γ_4 , and γ_5 are fixed-effects coefficients for sex, southern residence, and Catholic affiliation; μ_{3j} , μ_{4j} , and μ_{5j} are cohort-specific effects of sex, southern residence, and Catholic affiliation; and ν_{3k} , ν_{4k} , and ν_{5k} are period-specific effects of sex, southern residence, and Catholic affiliation.

Results

Cohort and Period Effects on Religious Service Attendance

I begin with a partial model of religious service attendance, with only age-fixed effects, which indicates the overall impact of age, period, and cohort on religious service attendance. Regression results are reported in Table 1. The partial model (Model 1) shows that age and age-square have strong effects on frequency of service attendance, and service attendance varies meaningfully by both cohort and period. The fixed-effects coefficients are interpreted in a manner similar to ordinary least square coefficients. Age has a positive effect on attendance, but the effect of age declines as age increases, as indicated by the negative effect of age-square. The random-effects variance components from Model 1 indicate relatively large differences in attendance by period but only moderate differences by cohort. The dashed lines in Figure 1 depict age, period, and cohort effects from Model 1. Period and cohort effects are estimated using residual random coefficients (see Yang and Land 2006). As Figure 1 shows, age has a strong, positive nonlinear effect on service attendance. Service attendance also varies by period, with a modest decline in number of days attending religious services during the 1990s. The cohort changes in Model 1 are small and reveal no clear trend.

The addition of control variables (Model 2) considerably alters the predicted age, period, and cohort effects on frequency of religious service attendance. The solid lines in Figure 1 depict age, period, and cohort effects from Model 2. With control variables in the model, the effect of age-square is positive rather than negative. Otherwise, the effect of age remains strong, with older Americans attending far more often than younger Americans. Period differences decline considerably with control variables in the model. The variance component for period goes from 2.33 in Model 1 to 0.55 in Model 2, which indicates that the addition of control variables explains more than three-quarters of the variation in attendance attributed to period changes in Model 1. The decline in attendance in the 1990s evident in Model 1 is absent in Model 2, suggesting that changes in the distribution of one or more control variables over time explains the small decline in attendance in the 1990s. Conversely, cohort differences are prominent with control variables in the model. The variance component for cohort increases from 0.23 in Model 1 to 13.64 in Model 2. As the bottom frame of Figure 1 shows, there is a large across-cohort decline in service attendance when control variables are included in the model. *Ceteris paribus*, members of the oldest birth cohort attend religious services more than 33 days per year while members of the youngest cohort attend services only 23 days per year. As I show in

Table 1. Linear, Cross-Classified Random-Effects Age-Period-Cohort Models of Days of Religious Service Attendance per Year, GSS, 1972-2006

Model 1	Model 2	Model 3
Fixed effects		
Intercept	26.43 (0.38)***	12.17 (1.39)*** 9.83 (0.56)***
Age	0.29 (0.01)***	0.17 (0.02)*** 0.14 (0.03)***
Age-square ^a	2.02 (0.01)***	0.01 (0.01)* 0.06 (0.01)***
Religious tradition (mainline Protestant reference)		
Catholic	9.15 (0.42)***	10.65 (1.02)***
Evangelical Protestant	16.14 (0.42)***	16.82 (0.57)***
Black Protestant	6.10 (0.81)***	6.36 (0.97)***
Jewish	210.93 (1.05)***	210.50 (1.42)***
Other Religion	12.64 (0.70)***	10.67 (0.96)***
No Religion	213.35 (0.56)***	215.25 (0.78)***
Female	6.66 (0.29)***	8.04 (0.62)***
South	3.22 (0.31)***	4.67 (0.59)***
Education	1.17 (0.05)***	1.21 (0.05)***
Married	4.62 (0.33)***	4.89 (0.33)***
Children in home	2.79 (0.33)***	3.06 (0.33)***
African American (White reference)	9.07 (0.67)***	9.13 (0.67)***
Other race (White reference)	2.00 (0.76)**	2.90 (0.76)***
Income	0.17 (0.18)	0.21 (0.18)
Urban (town/other urban reference)	22.09 (0.39)***	22.04 (0.39)***
Suburban (town/other urban reference)	22.59 (0.37)***	22.51 (0.37)***
Rural (town/other urban reference)	1.12 (0.45)*	1.21 (0.45)**
Age × Catholic	0.20 (0.03)***	
Age-square × Catholic ^a	2.02 (0.02)	
Age × evangelical Protestant	0.04 (0.03)	
Age-square × evangelical Protestant ^a	2.04 (0.01)**	
Continued		

TABLE 1 Continued

Model 1	Model 2	Model 3
Age × black Protestant	0.14 (0.04)***	
Age-square × black Protestant ^a	2.02 (0.02)	
Age × Jewish	2.17 (0.07)*	
Age-square × Jewish ^a	2.01 (0.04)	
Age × other religion	2.14 (0.05)**	
Age-square × other religion ^a	0.03 (0.03)	
Age × no religion	2.18 (0.04)***	
Age-square × no religion ^a	2.01 (0.02)	
Age × female	0.12 (0.02)***	

Age-square $\times$ female^a 2.03 (0.01)**

Age $\times$ South 0.07 (0.02)**

Age-square $\times$ South^a 2.03 (0.01)**

Random effects: variance components

Cohort

Intercept 0.23** 13.64*** 0.04

Catholic 1.92***

Female 1.22**

South 0.83*

Period

Intercept 2.33*** 0.55** 0.18***

Catholic 11.57***

Female 1.45***

South 1.11***

Individual 923.01 799.28 789.41

Goodness-of-fit (deviance) 394,351.35 388,485.75 388,033.23

Note: Standard errors in parentheses. Random-effects coefficients omitted in the interest of space. $n = 40,795$.

^aCoefficient and standard error multiplied by 10. * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$ (two-tailed test)

Figure 1. Estimated Number of Days per Year Attending Religious Services by (a) Age, (b) Period, and (c) Birth Cohort, GSS, 1972-2006

Note: Period and cohort effects based on random effects estimated from Model 1 and Model 2. Age effects based on fixed-effects coefficients in Model 1 and Model 2. Other variables set at their means. $n = 40,795$.

the next section, these apparent cohort changes are largely attributable to compositional changes across birth cohorts.

Compositional Changes across Cohorts: Education, Race/Ethnicity, and Children in the Home

The results in Model 2 show that when all else is equal the predicted frequency of service attendance declines considerably across birth cohorts. This does not, however, mean that each successive cohort is less likely than previous cohorts to attend religious services. As Model 1 shows, there is little overall across-cohort change in rates of religious service attendance. Instead, the predicted frequency of service attendance declines across cohorts only when relevant control variables are held constant, as Model 2 demonstrates. In reality, these factors are not constant across cohorts. In particular, education, race/ethnicity, and the presence of children in the home play an increasingly important role in influencing religious service attendance across cohorts. It is not that the effects of these independent variables on attendance are likely to become more robust across cohorts. Rather, the positive effects of education, minority racial status, and children in the home are influencing an increasingly larger proportion of the population.⁶ In other words, education, race/ethnicity, and the presence of children in the home are not equally distributed across birth cohorts.

The percent of non-white Americans and the education level of the average American have both risen considerably across cohorts of Americans born in the twentieth century. For instance, Americans with some college education went from 10 percent of the population in 1940 to almost 54 percent in 2006 (U.S. Census Bureau 2007). Thus, the positive effect of education influences an increasingly larger proportion of the population to attend religious services more frequently. Similarly, non-whites attend religious services more frequently than whites do, as the results in Table 1 show. The proportion of non-white Americans, especially Latino Americans, is also increasing, with Latinos now accounting for about one-third of all U.S. Catholics (Suro et al. 2007). In just a 10-year time span, from 1990 to 2000, the number of Latino Americans rose by 58 percent (U.S. Census Bureau 2001). The positive effect of

⁶If compositional changes in education, race/ethnicity, and the presence of children in the home explain the decline in attendance across cohorts evident in Model 2, as I propose, then the effects of these variables should not decline substantially across cohorts. To test this possibility, I analyzed cohort differences in the effects of education, race/ethnicity, and children in the home. I limited the sample in the analysis to respondent at least 25 years of age to prevent artificially limiting the variation in education. As the results in the Appendix show, there is no meaningful cohort variation in the effects of race/ethnicity on religious service attendance. Although there are cohort variations in the effects of education and children in the home, there is not a clear decline across cohorts in the impact of these factors on service attendance.

Figure 2. Estimated Number of Days per Year Attending Religious Services by Birth Cohort with Cohort-Specific Means for Education, Race, and Children in the Home, GSS, 1972-2006

Note: Cohort effects based on random effects estimated from Model 2. Control variables are set at their overall or grand means. for "cohort-specific means" line, education, race, and children in the home are set at the cohort means. $n = 40,795$.

minority status, therefore, is influencing an increasingly larger proportion of the population to attend more frequently as the minority population grows. Unlike minority race/ethnicity and education, there is no reason to expect a substantial increase in the likelihood of having children across cohorts. Nevertheless, the likelihood of currently having children in the home, which has a large, positive impact on service attendance, varies considerably across cohorts due to life-cycle changes. For instance, members of the oldest cohort in the GSS data are at least 63 years old, which makes them unlikely to have children in the home. Although the data employed in this analysis span more than three and a half decades, they are still susceptible to the drawbacks of repeated cross-sectional data. In particular, it is not possible to examine each birth cohort throughout the life-cycle.

Figure 2 demonstrates that compositional changes between birth cohorts explain most of the decline in attendance across cohorts evident in Model 2. The dashed line in Figure 2 is identical to the "Model 2" line or solid line in the third frame of Figure 1, which shows a decline of about 10 days of service attendance per year from the oldest cohort to the youngest cohort. This estimated number of days per year attending religious services is based on the overall or grand mean of the control variables. Some control variables, however, vary considerably from cohort to cohort. As the bottom of Figure 2 shows, the means for education, race, and children in the home change substantially by cohort. For instance, mean years of education for the

oldest cohort is 9.8 while for the youngest cohort mean years of education is 13.5. Similarly, the proportion white goes from 0.88 to 0.73 and the proportion with children in the home goes from 0.05 to 0.44 (with a high of 0.54 for the 1960-1969 cohort). The solid line in Figure 2 depicts estimated days of service attendance per year for each cohort using cohort-specific means for education, race, and the presence of children in the home. When cohort-specific means are used instead of the overall means, the difference in attendance between the oldest cohort and youngest cohort decreases from almost 10 days per year to less than 3.7 days per year. In sum, large differences in the likelihood of having children in the home over the life-course must be acknowledged to prevent misleading interpretations of the results. Additionally, the positive effects of education and minority race/ethnicity on religious service attendance influence an increasingly larger proportion of the U.S. population in each successive cohort due to rising levels of education and growing minority populations. In the next section, I examine factors that have a declining impact on religious service attendance.

Random Effects: Catholic Affiliation, Sex, and Southern Residence

The effects of southern residence, sex, and Catholic affiliation are permitted to vary across cohorts and periods in Model 3.⁷ To control for age variations in the effects of these variables, Model 3 includes interactions between age and dummy variables for each of the religious traditions, an interaction between age and South, and an interaction between age and sex. Although I am not focused on variations in age effects, it is interesting to note that the positive effect of age on attendance is particularly strong for black Protestants, Catholics, and those living in the south, and particularly weak for Jews, affiliates of other religions, and religious apostates. Additionally, the positive effect of age is stronger for women than for men, which is consistent with previous research noting that the effect of sex on attendance increases with age (Ploch and Hastings 1994). More importantly, the variance components in Model 3 demonstrate that the effects of Catholic affiliation, sex, and southern residence on religious service attendance vary considerably by both birth cohort and period.

Cohort and period variations in the effects of Catholic affiliation, southern residence, and sex from Model 3 are depicted in Figure 3. The first frame (a) focuses on across-cohort changes in the effects of these three indicators. As the first frame of Figure 3 shows, the once strong, positive effects of Catholic affiliation, female, and southern residence decline considerably between the oldest birth cohorts and those born in the 1950s; though these differences grow again for the final two birth cohorts. The estimated difference in service attendance between Catholics and

⁷Random coefficients for black Protestant, evangelical Protestant, and no religious affiliation are significant in partial models but not in the full model, which includes other random effects and age interactions. Additionally, there is no clear pattern to the cohort or period variations in the effects of black Protestant, evangelical Protestant, and no religious affiliation.

Figure 3. Estimated Difference in Number of Days per Year Attending Religious Services between Catholics and Mainline Protestants, Women and Men, and Southerners and Non-Southerners, by Period (Survey Year) and Birth Cohort, GSS, 1972-2006

Note: Figure based on random effects estimated from Model 3. $n = 40,795$.

mainline Protestants, for example, is over 12 days per year for those born between 1900 and 1929 but less than nine days per year for those born in the 1950s. Similarly, for Americans born in the 1950s, the difference between men and women reaches a low of just over six days per year and the difference between the South and the rest of the nation is only three days per year. While there is an increase in the effects of Catholic affiliation, sex, and southern residence from the 1950s cohort to the 1960s and 1970s cohorts, the impact of these three factors is still notably smaller among younger cohorts than among those born in the first three decades of the twentieth century.

The remaining three frames of Figure 3 depict period changes in the effects of Catholic affiliation, sex, and southern residence on religious service attendance. As Figure 3b shows, there is a large across-period decline in the effect of Catholic affiliation, relative to mainline Protestant affiliation. In 1972, Catholics attended religious services an average of 18 days per year more than mainline Protestants. By the late 1990s and in the first few years of the twenty-first century, the difference in attendance between Catholics and mainline Protestants was about six days per year. The effect of sex on service attendance also declines considerably from the 1970s to the end of the 1990s (Figure 3c). In 1972, women attended religious services an

average of 10 days per year more than men while the estimated difference in attendance between men and women was just over six days per year in 2006. The impact of southern residence on service attendance declines across time periods too, though it increases in more recent years (Figure 3d). While the estimated difference in attendance between southerners and non-southerners was almost six days per year in 1972, it was down to just over three days per year in 1996. From 1996 to 2006, however, the difference between those in the South and those in the rest of the nation increased, from just over three days per year to almost four and a half days per year.

Discussion and Conclusions

The above analysis addresses two questions. First, how do age, period, and birth cohort affect Americans' religious service attendance? The results show that there is little overall cohort effect on Americans' frequency of religious service attendance and only a modest period-based decline in attendance in the 1990s.⁸ Cohort effects evident when control variables are included in the model are primarily due to compositional changes across cohorts, which I discuss in further detail below. Additionally, age has a positive, nonlinear effect on service attendance. The second question is, are there cohort or period-based changes in the effects of Catholic affiliation, sex, and region on religious service attendance? The above analysis demonstrates that the positive effects of female, southern residence, and Catholic affiliation decline across cohorts beginning with those born in the 1930s and continuing through those born in the 1950s. There is a moderate increase in the impact of these three factors between the 1950s cohort and the 1960s and 1970s cohorts. Still, the effects of Catholic affiliation, sex, and region are smaller among the 1960s and 1970s cohorts than among the 1900 to 1929 cohorts. There are also substantial across-period changes in the effects of sex, region, and Catholic affiliation on the frequency of service attendance. The effects of Catholic affiliation and sex, in particular, decline a great deal from 1972 to 2006. The effect of southern residence also declines from 1972 to 1996, though there is an increase in the effect of southern residence from 1996 to 2006. Overall, the effect of southern residence and especially the effects Catholic affiliation and sex on frequency of religious service attendance have declined considerably.

The results in this article demonstrate that apparent cohort differences in frequency of religious service attendance are largely due to compositional changes between cohorts. While cross-classified, random effects models provide a powerful methodology for analyzing age, period, and cohort effects, these models are susceptible to the drawbacks inherent in cross-sectional data.

⁸Some researchers argue that surveys overestimate service attendance, predominantly due to respondent overreporting (e.g., Hadaway and Marler 2005). Even so, there is no credible evidence suggesting that overreporting of attendance has increased (Hout and Greeley 1998). Thus, the changes in attendance reported in this article should not be affected by overreporting.

Controlling for age does much to clarify potential cohort effects (Firebaugh and Harley 1991). Still, other life-cycle changes can substantially influence cohort analyses that use repeated cross-sectional data. As the above analysis shows, cohort variation in the presence of children in the home meaningfully influences the results. Cohort differences in the presence of children should be expected due to differences in stages of the life cycle. Yet, when these cohort differences in the presence of children are not accounted for, there appears to be a large across-cohort decline in the frequency of religious service attendance. Cohort variations in education and race/ethnicity also have a strong impact on the results. Much of the apparent decline in attendance between cohorts is based on the assumption that education and race are constant across cohorts, which they are not. When cohort-specific means are used to estimate frequency of religious service attendance, there is relatively little difference across cohorts. These results are an important reminder of the power of compositional changes—both compositional changes that reflect expected differences between groups due to the structure of the data, such as cohort variations in the presence of children in the home, and compositional changes that represent meaningful social change, such as across-cohort changes in education levels and racial composition.

While education and race play an increasingly large role in influencing religious service attendance due to compositional changes across cohorts, the impact of region, Catholic affiliation, and sex decline considerably across cohorts and especially across time periods. The declining influence of these three factors is not the result of compositional changes—the proportions of Americans who are Catholic, female, or living in the South have not declined markedly. In fact, the proportion who are Catholic and the proportion that live in the South have both increased in recent decades (Finke and Schwadel 2003; Perry and Mackun 2001). It is possible, however, that the declining impact of sex, region, and Catholic affiliation are related to rising education levels and growing minority populations. Education levels rose disproportionately among women (U.S. Census Bureau 2007), Catholics (Pyle 2006), and southerners (U.S. Census Bureau 2006) in recent decades. The decline in the effects of sex, region, and Catholic affiliation on service attendance may, therefore, be related to the positive effect of education on attendance. For instance, if sex differences in attendance are smaller among the more highly educated, as they are among those with full-time employment (Gee 1991), then the effect of sex on attendance should decline as sex differences in education decline. A similar argument can be made for the declining effects of Catholic affiliation and southern residence on attendance. Similarly, the large increase in the number of Latino Catholics and proportion of Latinos in the South suggest that the decline in the effects of Catholic affiliation and southern residence are likely partially due to the positive effect of minority status on attendance. Although the GSS does not code Latino/Hispanic in the race question, the “other race” variable has a strong, positive effect on religious service attendance, particularly when the effects of Catholic affiliation and southern residence vary across cohorts and periods (Model 3). Forty-five percent of respondents in the “other race” category—and 67 percent of Catholics in the “other race” category—

report that their families originate from Mexico, Puerto Rico, or “other Spanish” nations. This suggests that many Catholics and southerners are now attending religious services relatively frequently not because they are Catholic or because they are living in the South but because they are Latino.

Although the results in this article do not support secularization theories that predict declines in religious service attendance across birth cohorts, they do support research on the likely consequences of the movement of women into the public sphere and changes in the meaning associated with denominational affiliation in the United States. Various attributes, from risk aversion to personality traits to social integration, have been posited to explain differences in religious participation and religious salience between men and women (Sullins 2006). Recent research demonstrates that when social networks, religious socialization, and structural factors are held constant, there is no meaningful difference in the attendance rates of men and women in the United States (Sullins 2006). We should, therefore, expect religious service attendance rates between men and women to converge over time as these differences between men and women decline, which is supported by the above results. Differences among religious denominations are also changing. Wuthnow (1988, 1996) demonstrates that denominationalism is on the decline in the United States. He concludes that there is now more variation in liberal versus conservative religious ideologies within denominations than between denominations. Given this decline in denominationalism, it is not surprising that differences in attendance between Catholics and mainline Protestants have diminished. Wuthnow, Smith (1998), and others argue that theological self-identification is a better indicator of religious orientation than are religious tradition measures based on denominational affiliation. It is possible that while differences in attendance by religious tradition are declining, differences in attendance by theological self-identification remain large or even increase.

This article opens several avenues for future research. The above results suggest that even with the influx of Latino immigrants there may be declines in Catholics' attendance. White Catholics, in particular, might exhibit declines in service attendance across periods and/or cohorts. The possibility that theological self-identification may now play a larger role than denominational affiliation in predicting service attendance also merits further inquiry. Additionally, future research can add to the results in this article by identifying other predictors of religious participation that have varying effects by cohort or period. Finally, other aspects of religion may have changing correlates. Predictors of religious ideology and belief, for example, could also vary across cohorts or periods.

The frequency of religious service attendance in the United States is relatively stable over time. The above results show that this aggregate stability in attendance also applies across birth cohorts and time periods, other than a small period-based decline in the 1990s. As noted above, these results do not support individual-level secularization theories that predict declines in religious participation across birth cohorts (e.g., Chaves 1989; Sasaki and Suzuki 1987). Being religious, though, is not just about attending religious services; and secularization involves changes other than de-

clines in service attendance. For instance, secularization implies a decline in the impact of religion on both political and nonpolitical institutions (Chaves 1994). Despite the overall stability in religious service attendance, there are considerable changes in the effects of southern residence, sex, and Catholic affiliation on service attendance. These results serve as a reminder that we should not assume that relationships that exist at one time or among one cohort remain constant across periods or cohorts. Social change in relation to religious participation can manifest not only through potential changes in the levels of participation but also through changes in the effects of key predictors of religious participation. I conclude with this question, given the muted effects of southern residence, sex, and religious affiliation in recent years, do other factors have increasingly strong effects on religious participation?

Appendix

Birth Cohort Differences in Impact of Race, Education, and Children in the Home on Number of Days per Year Attending Religious Services, GSS, 1972-2006.

Note: Figure based on cross-classified random-effects age-period-cohort model of religious service attendance with the same variables as Model 2 plus education age ($b = 2.007$, $s.e. = 0.004$), African American $\times$ age ($b = 0.140$, $s.e. = 0.033$), other race $\times$ age ($b = 0.033$, $s.e. = 0.063$), and children in the home $\times$ age ($b = 2.014$, $s.e. = 0.030$), with random cohort and period effects for education, African American, other race, and children in the home. Other key independent variables: education ($b = 1.201$, $s.e. = 0.109$), African American ($b = 9.095$, $s.e. = 0.937$), other race ($b = 2.644$, $s.e. = 0.921$), and children in the home ($b = 2.625$, $s.e. = 0.536$). Education variance components: period = 0.016 ($p \leq 0.01$) and cohort = 0.060 ($p \leq 0.001$). African-American variance components: period = 5.820 ($p \leq 0.001$) and cohort = -0.894 (not

significant). Other race variance components: period = 1.170 ($p \leq 0.001$) and cohort = 0.500 (not significant). Children in the home variance components: period = 0.312 ($p \leq 0.001$) and cohort = 1.026 ($p \leq 0.01$). Age-square excluded from model due to non-significant effect. Education-square has a meaningful effect in partial models but not in the full model, and is therefore excluded from the model. Sample limited to respondents 25 years of age or older. $n = 36,897$.

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