

Religion and education: Evidence from the National Child Development Study

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Abstract

We explore the determinants of one aspect of religious behavior and church attendance, using individual level data from the British *National Child Development Study (NCDS)*, explicitly focusing on the relationship between education and church attendance. In contrast to the existing literature, our data allow an exploration of the dynamic dimension to religious activity since the *NCDS* provides information on church attendance at three stages of an individual's life cycle. The results support a positive association between education and church attendance. Additionally, current participation in religious activities is positively associated with past religious behavior.

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1. Introduction

Religious activity is one area of household behavior that has attracted relatively little interest in the economics literature. Although the boundaries surrounding areas of economics have widened, economists appear to have been reluctant to incorporate religion. Such reluctance is surprising since, as argued by Iannaccone (1998, p. 1465),

‘Studies of religion promise to enhance economics at several levels: generating information about a neglected area of “nonmarket” behavior; showing how economic models can be

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modified to address questions about belief, norms and values; and exploring how religion affects economic attitudes and activities of individuals, groups and societies.’

Over the last decade, interest in this expanding area of economics has increased with most of the empirical work based on U.S. data.¹ One strand of the literature has employed microeconomic theory to analyze the decision to participate in religious activities.

This paper explores the determinants of one type of religious activity, church attendance, at the individual level using British panel data from the *National Child Development Study (NCDS)*. Identifying the determinants of religious activity contributes to our understanding of the effects of religion on resource allocation. It may be the case, for example, that individuals substitute religious activities for labor market activities as argued by [Lipford and Tollison \(2003\)](#). We focus on the relationship between church attendance and education. [Iannaccone](#) has raised a number of interesting questions concerning the relationship between religion and education. For example, is it the case that individuals become less religious and more skeptical of faith-based claims as they acquire more education? With the acquisition of more education in the sciences, does the relationship become even more pronounced? Many studies have reported a positive association between religious activity and education.

Despite this, as highlighted by [Sander \(2002\)](#), such findings do not mean that education increases religious activity. In general, existing studies have treated education as exogenous despite the early work by [Azzi and Ehrenberg \(1975\)](#) who argue that human capital variables are endogenous. [Sander](#) expands the existing research by treating education as endogenous and finds no causal effect of education on religious activity.

We build upon the approach of [Sander](#) in three main ways. Firstly, we expand the church attendance equation to incorporate a richer array of explanatory variables. Secondly, we draw upon the recent economics of education literature and specify a more comprehensive educational attainment equation to control for endogeneity bias. Thirdly, we analyze individual panel data enabling us to investigate religious activity from a dynamic perspective, which to date has been unexplored. Our findings support a positive association between education and church attendance. In addition, we find that current participation in religious activities is positively associated with past religious activities. Furthermore, our findings suggest that levels of religious activity tend to vary less over time, suggesting that factors such as habit formation are important.

2. Background

In general, economists have explored the decision to engage in religious activity from the perspective of a time allocation model. [Azzi and Ehrenberg](#), for example, explored church attendance in the U.S. in the context of a household allocation of time model where participation in religious activity raises consumption in the ‘afterlife’. Subsequent research has incorporated a number of modifications and extensions to this seminal paper. For example, [Sullivan \(1985\)](#) modifies the framework by modeling church attendance and church contributions simultaneously. [Iannaccone](#) suggests that religious activity enhances current as well as ‘afterlife’ utility. One key implication is that the time allocated to religious activity may initially fall then rise with age, given that the opportunity cost of religious activity is initially high at the start of an individual’s career when faced with a relatively steep age-earnings profile. [Sawkins et al. \(1997\)](#) present empirical evidence consistent with the argument that time spent on church attendance has an opportunity cost.

¹ See [Iannaccone \(1998\)](#) for an excellent survey of the economics of religion.

Such findings suggest that the time dimension plays an important role. The predominant use of cross-section data in the existing literature has however limited the analysis of life cycle effects.

Educational attainment plays an important role in determining the opportunity cost of engaging in religious activities. However, Brañas-Garza and Neuman (2003) argue that the predicted effect of schooling on religious activities is ambiguous. A positive association between education and the opportunity cost of time devoted to religious activities implies an inverse relationship between religious activities and educational attainment. Sacerdote and Glaeser (2002) argue though that if education increases the returns from social activities, then one might predict a positive association between education and religious activities (i.e. a formal social activity). Whilst Barro and McCleary (2002) argue that since religious beliefs entail a degree of abstraction and, as better educated individuals are relatively more capable of scientific and abstract thought, they might be able to rationalize religious beliefs in this way.

Given the ambiguous effect of schooling on religious activities, empirical analysis plays an important role. Generally, empirical evidence supports a positive relationship between church attendance and educational attainment.² Furthermore, Sacerdote and Glaeser (2002, p. 2) state,

‘In many multivariate regressions, education is the most statistically important factor explaining church attendance.’

Sacerdote and Glaeser explore an interesting puzzle: religious attendance in the U.S. increases sharply with education across individuals, yet declines sharply with education across denominations with the more highly educated denominations having the lowest rates of church attendance. The key to explaining this puzzle lies in the existence of omitted variables, which differ across denominations. Furthermore, Sacerdote and Glaeser argue that the most likely omitted variable is the degree of religious beliefs. They provide evidence that measures of religious beliefs are strongly correlated with church attendance yet negatively correlated with education for a number of countries including the U.S. and Great Britain. Moreover, they provide some evidence of a causal link that education moderates religious beliefs.

Sawkins et al. (1997), one of the rare studies focusing on British data, find a positive correlation between church attendance and educational attainment when estimating gender specific attendance equations based on the first wave of the *British Household Panel Survey*. Similarly, Brañas-Garza and Neuman explore the level of religiosity as measured by beliefs, prayer and church attendance amongst Spanish Catholics by estimating separate equations for males and females. They report a marginally significant positive relationship between schooling and religiosity. An interesting feature of this study is that the data allow the authors to distinguish between private and public religious activity. The positive relationship is statistically significant for women for both participation in mass (i.e. a public activity) and prayer (i.e. the private activity), yet only significant for men in the case of participation in mass.

3. Data and methodology

Our empirical analysis employs the British *National Child Development Study* (NCDS), a panel survey following a cohort of children born during a given week (March 3–9) in 1958. This panel study provides a wealth of information relating to family background in addition to having the

² See Iannaccone (1998) and Sacerdote and Glaeser (2002).

advantage of tracing an individual over a relatively long time horizon. The survey follows the same individuals at ages 7, 11, 16, 23, 33 and 42 years.

The *NCDS* is particularly appropriate for our analysis since it provides information pertaining to church attendance in addition to detailed information relating to educational attainment. Respondents are asked the following question about church attendance at ages 23, 33 and 42 years:

How often, if at all, do you attend services or meetings connected with your religion?

<i>Never or very rarely</i>	0
<i>Sometimes, but less than once a month</i>	1
<i>Once a month or more</i>	2
<i>Once a week</i>	3

We construct a four-point church attendance index, providing information about the level of church attendance at three points in time.³ We initially conduct cross-section analysis for the latest survey where the church attendance index in 2000, r_i , represents the dependent variable. We then conduct panel data analysis by pooling the information for individuals across the three periods (1981, 1991 and 2000) to explore how church attendance, r_{it} , varies over the life cycle.

3.1. Cross-section analysis

Given the ordinal nature of the dependent variable we specify an ordered probit model, see [McKelvey and Zavoina \(1975\)](#):

$$r_i^* = \beta_0 + \beta_1 e_i + \phi' X_i + \varepsilon_i \quad (1)$$

where r_i^* is the unobservable propensity of individual i to attend church, r_i the individual's observed church attendance, e_i denotes the educational attainment of individual i and X_i denotes a vector of personal and demographic characteristics. Our cross-section data set for 2000 (i.e. age 42 years) comprises 6913 individuals.

We compare two commonly used measures of educational attainment: years of education and the highest educational qualification obtained. Initially, we treat educational attainment as exogenous. Following [Sander](#), we then treat educational attainment as potentially endogenous. Thus, we incorporate an educational attainment equation into our empirical analysis and replace e_i with its predicted value, \hat{e}_i , as follows:

$$e_i = f(Z_i) + \lambda_i, \quad (2a)$$

$$r_i^* = \beta_0 + \beta_1 \hat{e}_i + \phi' X_i + \varepsilon_i. \quad (2b)$$

The functional form of Eq. (2a) differs according to the definition of educational attainment. We adopt a standard *OLS* approach for years of education whilst in the case of the highest educational qualification obtained, we follow [Dearden et al. \(2002\)](#) and adopt an ordered probit model.⁴ The highest educational qualification index is defined on a seven-point scale with 0 representing no educational qualifications, 1 denotes CSE level education (a relatively 'low' high

³ It is important to acknowledge that our index of church attendance is a proxy for time spent on religious activities. Time spent on other religious activities such as praying is clearly omitted from our dependent variable.

⁴ [Heckman and Cameron \(1998\)](#) analyzed and confirmed the validity of such an approach.

school qualification taken at age 16 years), 2 denotes O level (a relatively ‘high’ high school qualification taken at age 16 years), 3 denotes A level (the school qualification taken at age 18 years), 4 denotes diploma (i.e. intermediate qualifications between high school and university degree), 5 denotes degree (i.e. a Bachelors degree) and 6 denotes a higher degree (i.e. a Masters degree or a Ph.D.).⁵

There has been much interest in the economics literature in the determinants of educational success; see, for example, Dearden et al. (2002) and Dustmann et al. (2003). We draw upon this literature to specify Eq. (2a). The explanatory variables in Z_i are divided into three groups: school quality, family background and ability.

We adopt one of the standard measures of school quality: the number of pupils per teacher in the school at both the primary (i.e. pre-age 11 years) and secondary (i.e. post-age 11 years) stages of education. We also control for whether, at the age of 16 years, the individual attended a secondary modern school, a technical school, a comprehensive school (i.e. nonselective and state run), a grammar school (higher ability and state run) or a private school, as well as for whether the individual attended a single sex school at age 16 years. Controls also include a dummy variable denoting the presence of a parents–teachers association as well as a set of dummy variables indicating whether the school lacked library, sports or other facilities.

Following Ermisch and Francesconi (2001), we incorporate a variety of controls for family background given that it may influence educational attainment through time inputs and/or financial resources. Family background variables include parents’ occupation, years of education of parents, household income, the number of older siblings and the number of younger siblings. We include information indicating whether the teacher considers the mother and/or father to be interested in the child’s education at the age of 16 years. To proxy further for family resources, we include a dummy variable indicating whether the individual has a private room for studying at age 16 years. We also include dummy variables indicating whether the child received free school meals at ages 11 and 16 years. In addition to controlling for whether the families experienced financial difficulties, we augment the approach adopted by Dearden et al. (2002) by controlling for other difficulties faced by families such as alcoholism, death of mother or father and divorce.

To proxy ability, we include the individuals’ scores attained in reading and mathematics tests at ages 7, 11 and 16 years. We proxy the child’s attitude towards school by including a dummy variable that equals one if he/she was truant at least once when aged 16 years.

Returning to the church attendance equation, we include a number of additional controls in the X_i vector including religious denomination, gender, being disabled, marital status, household size (including the presence of pre-school and other children) and ethnicity.⁶ One serious omission relates to information on parents’ religion and religious upbringing. To control for the stock of religious human capital as a child, we control for whether the individual has a CSE, O level or A level in Religious Education. To explore the arguments of Barro and McCleary, we incorporate a dummy variable indicating whether the individual has a CSE, O level or A level qualification in a science subject (i.e. Biology, Chemistry or Physics).

⁵ Both CSE (the equivalent of GCSEs grades below C) and O levels (the equivalent of GCSEs grades A–C) were replaced by GCSEs in the 1980s. CSE/O levels were taken after 11 years of formal compulsory education and approximate the U.S. honours high school curriculum. A levels are public examinations taken by 18-year olds over a 2-year period, usually studying a set syllabus in one to four subjects. This qualification is the major determinant of eligibility for entry to higher education in the UK.

⁶ Note that age is excluded from the empirical specification since all individuals are of equal age.

A set of variables related to economic status is incorporated in X_i , including total income and total income squared to explore whether the opportunity cost of church attendance increases with income.⁷ We control for unemployment and self-employment as well as whether the individual's spouse is unemployed. We follow Ellison (1993) in incorporating measures of health and life satisfaction to ascertain whether higher rates of religious activity are associated with increased life satisfaction, improved health and reduced stress. We control for whether the individual feels that he/she has someone to turn to for support. An index is also included denoting how the individual perceives the closeness of the members of the household. Following Sacerdote and Glaeser, we include two variables representing the extent of participation in other formal social group activities such as attendance at political party meetings, charity and voluntary group meetings.

To explore the effects of past religious activity on current religious activity, we control for church attendance at ages 23 and 33 years. Past religious activities may be positively associated with current religious activities since, according to Smith et al. (1998, p. 29),

‘... Religious human capital and participation are complements since past and present consumption will be positively related. Moreover, the accumulation of religious human capital provides an incentive for further religious participation, which in turn augments that capital stock. This complementarity generates the habitual character of church attendance.’

The higher the level of human capital acquired by past participation in religious activities, the more likely an individual is to continue to engage in religious activities. The empirical literature to date has been unable to analyze this potentially important dynamic aspect of religious behavior.

3.2. Panel data analysis

We also analyze a balanced panel of data, enabling us to explore whether religious activity varies over the life cycle, comprising 6834 individuals who participated in all three surveys at ages 23, 33 and 42 years, yielding 20,502 observations. Given the nature of the dependent variable, we adopt an ordered probit estimator with individual random effects, where the dependent variable represents the church attendance index:

$$r_{it}^* = \beta_0 + \beta_1 e_{it} + \boldsymbol{\varphi}' X_{it} + v_{it} \quad (3a)$$

$$v_{it} = \alpha_i + \eta_{it} \quad (3b)$$

where r_{it}^* is the unobservable propensity of individual i to attend church at time period t , r_{it} represents the individual's observed church attendance, X_{it} a vector of exogenous characteristics which are expected to influence r_{it}^* , $\boldsymbol{\varphi}$ the associated vector of coefficients, e_{it} represents the individual's educational attainment, β_1 the coefficient representing the impact of education on church attendance and α_i is the individual specific unobservable effect that captures differences in the propensity of church attendance. The individual specific unobservable effect, α_i , represents a normally distributed individual random characteristic that is fixed over time whilst η_{it} is a time-varying random error term. We assume a random effects specification, where $\eta_{it} \text{IN}(0, \sigma_\eta^2)$, and in order to marginalize the likelihood, it is assumed that, conditional on e_{it} and X_{it} , α_i are $\text{IN}(0, \sigma_\alpha^2)$

⁷ Lipford and Tollison simultaneously estimate the effects of religious participation on income and the effects of income on religious participation using U.S. state data.

and are independent of η_{it} and X_{it} . This implies that the correlation between the error terms of individuals is a constant given by

$$\rho = \text{corr}(v_{il}, v_{ik}) = \frac{\sigma_\alpha^2}{\sigma_\alpha^2 + \sigma_\eta^2}, \quad l \neq k. \quad (4)$$

Thus, ρ represents the proportion of the total variance contributed by the panel level variance component. For a full discussion of the random effects probit model, see Arulampalam (1999).⁸

The random effects framework allows us to establish how much of the variation in the data can be explained by unobservable intra-individual correlations. The magnitude of ρ provides information pertaining to whether individuals are likely to report consistent levels of religious activity across the three time periods, conditional on the underlying covariates or whether religious activity is subject to variation over the life cycle. The analysis of panel data is particularly appropriate for exploring rates of religious behavior since existing research has found age to be a particularly strong indicator of religious activity with religious activity increasing with age. Explanations of such findings include habit formation and the increasing importance of afterlife expectations (Iannaccone).

Table 1A presents cross-tabulations between church attendance in 1981 (i.e. age 23 years) and in 1991 (i.e. age 33 years) and between 1991 and 2000 (i.e. age 42 years). The shaded boxes along each diagonal highlight the extent to which church attendance is invariant over time. Between ages 23 and 33 years, around 67% of individuals did not change their frequency of attendance, with the remaining 2255 individuals (shown in the off-diagonal elements) generally reducing attendance, notably with a large increase in attending church ‘*sometimes, but less than once a month*’. A similar pattern emerges if we focus on attendance between 33 and 42 years with 66% of individuals not changing their frequency of attendance. It is also apparent that attendance at the highest and lowest levels are the most time invariant whilst the intermediate levels of church attendance are subject to more variation over time. Between the two periods depicted in Table 1A, individuals appear to attend church less over the life cycle with 61.7% reporting ‘*never or rarely attended church*’ compared to 71.1% in the later period.

We also explore the possibility that education may be endogenous. Hence, we estimate the following:⁹

$$e_{it} = g(\mathbf{Z}_{it}) + \lambda_{it}, \quad (5a)$$

$$r_{it}^* = \beta_0 + \beta_1 \hat{e}_{it} + \boldsymbol{\varphi}' \mathbf{X}_{it} + v_{it}. \quad (5b)$$

The set of explanatory variables in X_{it} is similar to that used in the cross-section analysis comprising a mixture of time varying variables (such as marital status and economic activity) and time invariant information (such as ethnicity).¹⁰ It is apparent that religious denomination may

⁸ As in the standard ordered probit framework, the observed church attendance index, $r_{it} = k$, where $k = 0, 1, 2$ and 3 , corresponds to the latent variable $r_{it}^* \in [\lambda_k, \lambda_{k+1}]$, where λ_k represents the k th cut-off point, which is increasing in k . To account for the random effects in the context of this ordinal variable, the cumulative density function is computed from $\Pr(r_{it}^* \leq k | X_{it}, e_{it}) = \Pr(\beta_0 + \beta_1 e_{it} + \boldsymbol{\varphi}' X_{it} + \alpha_i + \eta_{it} \leq \lambda_k)$ (D'Addio et al., 2003).

⁹ If education is measured by years of schooling, then Eq. (5a) is estimated by OLS, or if the highest educational qualification index is used, a random effects ordered probit model is specified.

¹⁰ A small number of variables were omitted from the panel data analysis due to inconsistencies in the questions posed across the three surveys. These include the happiness index, whether the individual works for a charity, attendance at other formal social activities, the perceived index of support and the variable controlling for how close the individual believes his/her family is.

Table 1A
Cross-tabulations of church attendance over time

		1991 AGE 33					2000 AGE 42						
		0	1	2	3	Total			0	1	2	3	Total
1981 AGE 23	0	3,867 (72.89)	1,061 (20.0)	126 (2.38)	251 (4.73)	5,305 (77.63)	1991 AGE 33	0	3,637 (86.33)	416 (9.87)	78 (1.85)	82 (1.95)	4,213 (61.65)
	1	216 (29.71)	318 (43.74)	76 (10.45)	117 (16.09)	727 (10.64)		1	994 (64.88)	396 (25.85)	82 (5.35)	60 (3.92)	1,532 (22.42)
	2	55 (21.65)	78 (30.71)	35 (13.78)	86 (33.86)	254 (3.72)		2	97 (35.14)	80 (28.99)	56 (20.29)	43 (15.58)	276 (4.04)
	3	75 (13.69)	75 (13.69)	39 (7.12)	359 (65.51)	548 (8.02)		3	134 (16.48)	139 (17.10)	131 (16.11)	409 (50.31)	813 (11.90)
	Total	4,213 (61.65)	1,532 (22.42)	276 (4.04)	813 (11.90)	6,834 (100)		Total	4,862 (71.14)	1,031 (15.09)	347 (5.08)	594 (8.69)	6,834 (100)

Notes: (i) Figures in parenthesis are percentages and (ii) attendance frequencies: 0, never or very rarely; 1, sometimes, but less than once a month; 2, once a month or more; 3, once a week.

Table 1B
Cross-tabulations of religious denomination over time

		1991 AGE 33						2000 AGE 42							
		0	1	2	3	4	Total			0	1	2	3	4	Total
1981 AGE 23	0	2,393 (78.98)	533 (17.59)	69 (2.28)	21 (0.69)	14 (0.46)	3,030 (44.34)	1991 AGE 33	0	2,175 (56.71)	1,281 (33.40)	213 (5.55)	112 (2.92)	54 (1.41)	3,835 (56.12)
	1	822 (33.58)	1,592 (65.03)	17 (0.69)	16 (0.65)	1 (0.04)	2,448 (35.82)		1	391 (17.92)	1,757 (80.52)	12 (0.55)	17 (0.78)	5 (0.23)	2,182 (31.93)
	2	161 (23.20)	5 (0.72)	527 (75.94)	0 (0.00)	1 (0.14)	694 (10.16)		2	23 (3.74)	13 (1.95)	577 (93.82)	0 (0.00)	3 (0.49)	615 (9.00)
	3	81 (42.63)	25 (13.16)	0 (0.00)	84 (44.21)	0 (0.00)	190 (2.78)		3	21 (16.28)	11 (8.53)	0 (0.00)	97 (75.19)	0 (0.00)	129 (1.89)
	4	378 (80.08)	27 (5.72)	2 (0.42)	8 (1.69)	57 (12.08)	472 (6.91)		4	6 (8.22)	1 (1.37)	1 (1.37)	0 (0.00)	65 (89.04)	73 (1.07)
	Total	3,835 (56.12)	2,182 (31.93)	615 (9.00)	129 (1.89)	73 (1.07)	6,834 (100)		Total	2,616 (38.28)	3,062 (44.81)	803 (11.75)	226 (3.31)	127 (1.86)	6,834 (100)

Notes: (i) Figures in parenthesis are percentages and (ii) denomination categories: 0, no religion; 1, Church of England; 2, Roman Catholic; 3, Methodist; 4, other and non-Christian.

change over time as individuals switch in and out of different religions. Iannaccone argues that the extent of such switching declines over the life cycle. **Table 1B** presents cross-tabulations between religious denomination in 1981 (i.e. age 23 years) and in 1991 (i.e. age 33 years) and between 1991 and 2000 (i.e. age 42 years), giving an insight into the dynamics of religious denomination. The shaded boxes along each diagonal again highlight the extent to which religious denomination is invariant over time. Interestingly there is some variation over time, but as Iannaccone argued, switching between denominations diminishes over the life cycle. It is apparent that each figure along the lead diagonal for ages 33 and 42 years is greater than its counter-part for the earlier stage in the life cycle (i.e. between ages 23 and 33 years).

The following section presents the results of the cross-section and panel data analysis focusing on our main question of investigation, whether educational attainment has a positive or negative effect on church attendance (i.e. whether $\beta_1 \geq 0$ or $\beta_1 \leq 0$). For full summary statistics relating to the cross-section data and the panel data see **Table 2**.

4. Results

4.1. Cross-section results

4.1.1. Exogenous education

Table 3 presents the results from the cross-section analysis of the determinants of church attendance at age 42 years where education is treated as exogenous. To explore the robustness of our findings, we present six specifications. Specifications 1 and 2 incorporate highest educational qualifications whilst years of education underlie specifications 3–6. Specifications 2, 4 and 6 also include past church attendance (i.e. at ages 23 and 33 years).¹¹

It is apparent from specifications 1 and 2 that educational attainment at the upper end of the hierarchy (i.e. degrees undergraduate and postgraduate and diplomas), are positively associated with church attendance. Lower levels of education, on the other hand, appear to have no significant impact on church attendance, with the exception of CSE level education, which has a negative influence. It is also apparent from **Table 3** that there is a positive relationship between years of education and church attendance.

In general, the sizes of the estimated coefficients on the educational attainment variables and significance are somewhat reduced once past religious activity is incorporated into the analysis. There is a strong positive relationship between past and current levels of church attendance and this association is heightened over time. Our findings support the argument of **Smith et al. (1998)** that the accumulation of religious human capital is positively associated with future religious activity. Support for this argument also comes from the significant and positive estimated coefficient on the dummy variable indicating whether the individual has an O or A level in Religious Education. This finding is confirmed across the six different specifications. The findings related to the possession of an O or A level in a science subject, however, follow a much less distinct pattern in terms of statistical significance, but always have a negative sign. This finding provides some support for the argument that individuals become more skeptical of faith-based claims as they acquire education in science-based subjects.

Our findings with respect to gender tie in with the existing literature in that females exhibit higher levels of church attendance than males, consistent with **Iannaccone (1998)**, **Sawkins et**

¹¹ For reasons of brevity, we do not present the marginal effects, although these are available on request.

Table 2
Summary statistics

	Cross-section: age 42 years				Panel: ages 23–42 years			
	Mean	Std.	Min.	Max.	Mean	Std.	Min.	Max.
Church attendance _{AGE 42}	0.512	0.934	0	3	–	–	–	–
Church attendance _{AGE 33}	0.660	1.009	0	3	–	–	–	–
Church attendance _{AGE 23}	0.419	0.892	0	3	–	–	–	–
Years of schooling	12.225	2.212	9	36	12.517	2.213	9	36
Church attendance across time	–	–	–	–	0.532	0.952	0	3
Higher degree	0.033	0.179	0	1	0.019	0.137	0	1
Degree	0.133	0.340	0	1	0.127	0.333	0	1
Diploma	0.245	0.430	0	1	0.095	0.293	0	1
A levels	0.158	0.364	0	1	0.082	0.274	0	1
O levels	0.453	0.498	0	1	0.322	0.467	0	1
CSE	0.243	0.429	0	1	0.213	0.409	0	1
Science O/A level	0.026	0.158	0	1	0.025	0.157	0	1
Religion O/A level	0.008	0.087	0	1	0.008	0.088	0	1
Male	0.462	0.499	0	1	0.460	0.498	0	1
Disabled	0.290	0.454	0	1	0.114	0.318	0	1
Mixed race	0.002	0.042	0	1	0.002	0.042	0	1
Asian	0.005	0.069	0	1	0.005	0.069	0	1
Black	0.003	0.057	0	1	0.003	0.057	0	1
Married	0.722	0.448	0	1	0.632	0.482	0	1
Separated/widow/ divorced	0.108	0.310	0	1	0.080	0.271	0	1
Household size	3.482	1.307	1	10	3.304	1.361	1	24
Children 0–6	0.186	0.390	0	1	0.268	0.443	0	1
Children 5–16	0.628	0.483	0	1	0.384	0.486	0	1
Family close index	1.877	1.363	0	3	–	–	–	–
Unemployed	0.018	0.133	0	1	0.038	0.190	0	1
Self-employed	0.099	0.298	0	1	0.084	0.277	0	1
Partner unemployed	0.013	0.114	0	1	0.023	0.150	0	1
log(total income)	4.749	2.306	–1.386	11.433	4.286	1.729	–1.999	11.736
log(total income ²)	27.879	16.019	0	130.709	21.357	11.069	0	137.735
Health index	1.945	0.898	0	3	–	–	–	–
Happiness index	1.846	0.582	0	3	2.169	0.783	0	3
Perceived support	0.969	0.174	0	1	–	–	–	–
Employed by a charity	0.025	0.155	0	1	–	–	–	–
Attendance charity/voluntary	0.137	0.449	0	3	–	–	–	–
Attendance other club	0.217	0.670	0	3	–	–	–	–
Roman Catholic (RC)	0.118	0.323	0	1	0.103	0.304	0	1
Church of England (COE)	0.448	0.497	0	1	0.375	0.484	0	1
Methodist	0.033	0.178	0	1	0.027	0.161	0	1
Other and non-Christian (otherNC)	0.019	0.136	0	1	0.033	0.178	0	1
Schooling × RC	1.434	3.994	0	36	1.287	3.869	0	36
Schooling × COE	5.384	6.110	0	36	0.339	2.086	0	28
Schooling × methodist	0.401	2.209	0	21	4.639	6.117	0	36
Schooling × other NC	0.248	1.829	0	27	0.421	2.322	0	27
Observations	6913				20502			

Table 3
The determinants of church attendance at age 42 years (cross-section estimates with exogenous education)

	SPEC1	SPEC2	SPEC3	SPEC4	SPEC5	SPEC6
Church attendance _{AGE 33}	–	0.538 (29.51) [#]	–	0.539 (29.60) [#]	–	0.537 (29.37) [#]
Church attendance _{AGE 23}	–	0.283 (14.22) [#]	–	0.287 (14.40) [#]	–	0.287 (14.39) [#]
Years of schooling	–	–	0.061 (8.52) [#]	0.021 (2.70) [#]	0.023 (2.17) [#]	0.001 (0.11)
Higher degree	0.266 (3.19) [#]	0.154 (1.73)	–	–	–	–
Degree	0.233 (4.81) [#]	0.080 (1.74)	–	–	–	–
Diploma	0.150 (4.08) [#]	0.101 (2.59) [#]	–	–	–	–
A levels	0.057 (1.29)	–0.015 (0.33)	–	–	–	–
O levels	–0.146 (0.41)	–0.016 (0.42)	–	–	–	–
CSE	–0.244 (5.57) [#]	–0.113 (2.44) [#]	–	–	–	–
Science O/A level	–0.234 (2.13) [#]	–0.160 (1.37)	–0.179 (1.79)	0.147 (1.30)	–0.173 (1.63)	–0.144 (1.27)
Religion O/A level	0.518 (3.04) [#]	0.377 (2.04) [#]	0.506 (2.97) [#]	0.373 (2.02) [#]	0.475 (2.78) [#]	0.361 (1.96) [#]
Male	–0.276 (7.48) [#]	–0.076 (2.34) [#]	–0.285 (7.77) [#]	–0.128 (3.26) [#]	–0.279 (7.61) [#]	–0.125 (3.20) [#]
Disabled	0.078 (2.02) [#]	0.044 (1.07)	0.077 (2.00) [#]	0.043 (1.05)	0.076 (1.99) [#]	0.042 (1.04)
Mixed race	0.215 (0.60)	0.325 (0.85)	0.179 (0.49)	0.298 (0.78)	0.233 (0.65)	0.348 (0.91)
Asian	0.620 (2.83) [#]	0.348 (1.51)	0.609 (2.78) [#]	0.343 (1.49)	0.608 (2.77) [#]	0.344 (1.49)
Black	0.501 (1.96) [#]	0.601 (2.32) [#]	0.477 (1.88)	0.583 (2.26) [#]	0.457 (1.79)	0.572 (2.22) [#]
Married	0.320 (6.22) [#]	0.223 (4.07) [#]	0.322 (6.27) [#]	0.222 (4.07) [#]	0.313 (6.08) [#]	0.219 (4.00) [#]
Separated/widow/divorced	0.227 (3.36) [#]	0.162 (2.26) [#]	0.226 (3.35) [#]	0.158 (2.22) [#]	0.220 (3.26) [#]	0.157 (2.20) [#]
Household size	0.036 (2.00) [#]	0.017 (0.90)	0.035 (1.96) [#]	0.016 (0.81)	0.036 (1.99) [#]	0.016 (0.85)
Children 0–6	0.161 (3.58) [#]	0.288 (6.08) [#]	0.171 (3.80) [#]	0.296 (6.28) [#]	0.169 (3.75) [#]	0.295 (6.24) [#]
Children 5–16	0.075 (1.03)	0.044 (0.58)	0.088 (1.21)	0.048 (0.64)	0.086 (1.18)	0.049 (0.65)
Family close index	0.036 (1.38)	0.038 (1.41)	0.033 (1.25)	0.037 (1.37)	0.034 (1.32)	0.038 (1.39)
Unemployed	–0.088 (0.64)	0.102 (0.72)	–0.078 (0.57)	0.101 (0.71)	–0.079 (0.57)	0.097 (0.68)
Self-employed	–0.011 (0.20)	0.020 (0.35)	–0.036 (0.65)	0.009 (0.17)	–0.036 (0.65)	0.009 (0.15)
Partner unemployed	–0.088 (0.63)	–0.017 (0.11)	–0.103 (0.73)	–0.028 (0.19)	–0.100 (0.72)	–0.028 (0.19)
log(total income)	–0.002 (0.06)	–0.033 (1.25)	–0.008 (0.32)	–0.038 (1.47)	–0.005 (0.22)	–0.037 (1.42)
log(total income ²)	–0.001 (0.07)	0.004 (1.02)	0.002 (0.42)	0.005 (1.37)	0.001 (0.26)	0.005 (1.30)
Health index	0.028 (1.43)	0.001 (0.04)	0.032 (1.60)	0.020 (0.12)	0.031 (1.55)	0.002 (0.08)
Happiness index	–0.003 (0.12)	–0.021 (0.74)	–0.002 (0.07)	–0.021 (0.73)	–0.002 (0.07)	–0.022 (0.75)
Perceived support	0.168 (1.63)	0.126 (1.15)	0.157 (1.52)	0.125 (1.14)	0.153 (1.49)	0.124 (1.14)
Employed by a charity	0.228 (2.39) [#]	0.148 (1.43)	0.257 (2.69) [#]	0.163 (1.57)	0.261 (2.72) [#]	0.165 (1.59)

Attendance charity/voluntary	0.393 (12.12) [#]	0.229 (6.59) [#]	0.395 (12.17) [#]	0.229 (6.60) [#]	0.397 (12.21) [#]	0.231 (6.62) [#]
Attendance other club	0.183 (8.33) [#]	0.130 (5.62) [#]	0.188 (8.60) [#]	0.134 (5.78) [#]	0.187 (8.53) [#]	0.132 (5.72) [#]
Roman Catholic	0.834 (16.84) [#]	0.339 (6.18) [#]	0.828 (16.75) [#]	0.332 (6.06) [#]	0.323 (1.24)	0.322 (1.10)
Church of England	0.113 (3.10) [#]	0.118 (3.05) [#]	0.089 (2.49) [#]	0.105 (2.73) [#]	−0.981 (5.03) [#]	−0.518 (2.46) [#]
Methodist	0.263 (2.98) [#]	0.210 (2.26) [#]	0.253 (2.87) [#]	0.204 (2.20) [#]	−0.433 (0.83)	−0.236 (0.42)
Other and non-Christian	0.752 (6.42) [#]	0.596 (4.88) [#]	0.739 (6.31) [#]	0.595 (4.88) [#]	1.376 (2.79) [#]	0.885 (1.74)
Schooling × RC	–	–	–	–	0.040 (1.93)	0.001 (0.02)
Schooling × COE	–	–	–	–	0.086 (5.59) [#]	0.050 (3.02) [#]
Schooling × methodist	–	–	–	–	0.055 (1.32)	0.035 (0.80)
Schooling × other NC	–	–	–	–	−0.047 (1.28)	−0.021 (0.56)
LR $\chi^2(d)$	1157.10 ($d=34$)	2944.86 ($d=36$)	1120.05 ($d=29$)	2930.23 ($d=31$)	1157.77 ($d=33$)	2942.26 ($d=35$)
	$p=0.000$	$p=0.000$	$p=0.000$	$p=0.000$	$p=0.000$	$p=0.000$
Observations	6913					

Note: *T*-statistics are shown in parenthesis.

[#] Statistically significant at the 5% level or above (based on a two-tailed test).

Table 4
The determinants of church attendance at age 42 years (cross-section estimates with endogenous education)

	SPEC1	SPEC2	SPEC3	SPEC4	SPEC5	SPEC6
Church attendance _{AGE 33}	–	0.537 (29.45) [#]	–	0.536 (29.32) [#]	–	0.531 (28.99) [#]
Church attendance _{AGE 23}	–	0.286 (14.37) [#]	–	0.285 (14.33) [#]	–	0.285 (14.33) [#]
Years of schooling	–	–	0.156 (10.88) [#]	0.067 (4.36) [#]	0.061 (2.66) [#]	0.002 (0.09)
Highest education index	0.123 (9.61) [#]	0.055 (4.01) [#]	–	–	–	–
Science O/A level	–0.184 (1.74)	–0.154 (1.36)	–0.198 (1.87)	–0.161 (1.42)	–0.206 (1.93)	–0.165 (1.45)
Religion O/A level	0.555 (3.26) [#]	0.392 (2.12) [#]	0.556 (3.26) [#]	0.392 (2.12) [#]	0.543 (3.17) [#]	0.386 (2.08) [#]
Male	–0.286 (7.80) [#]	–0.128 (3.27) [#]	–0.283 (7.69) [#]	–0.127 (3.24) [#]	–0.283 (7.67) [#]	–0.127 (3.25) [#]
Disabled	0.081 (2.11) [#]	0.045 (1.10)	0.077 (2.01) [#]	0.043 (1.05)	0.076 (1.98) [#]	0.042 (1.04)
Mixed race	0.308 (0.85)	0.362 (0.95)	0.302 (0.84)	0.357 (0.94)	0.244 (0.68)	0.329 (0.87)
Asian	0.726 (3.31) [#]	0.393 (1.70)	0.727 (3.31) [#]	0.391 (1.70)	0.542 (2.39) [#]	0.303 (1.28)
Black	0.504 (1.98) [#]	0.599 (2.33) [#]	0.522 (2.05) [#]	0.606 (2.35) [#]	0.495 (1.94)	0.591 (2.29) [#]
Married	0.313 (6.09) [#]	0.219 (4.02) [#]	0.313 (6.08) [#]	0.220 (4.03) [#]	0.304 (5.89) [#]	0.216 (3.94) [#]
Separated/widow/divorced	0.233 (3.45) [#]	0.164 (2.30) [#]	0.233 (3.45) [#]	0.164 (2.30) [#]	0.217 (3.21) [#]	0.155 (2.16) [#]
Household size	0.034 (1.87)	0.016 (0.82)	0.037 (2.03) [#]	0.017 (0.88)	0.038 (2.08) [#]	0.018 (0.92)
Children 0–6	0.163 (3.63) [#]	0.289 (6.13) [#]	0.145 (3.22) [#]	0.282 (5.96) [#]	0.138 (3.05) [#]	0.277 (5.83) [#]
Children 5–16	0.068 (0.94)	0.041 (0.55)	0.062 (0.86)	0.039 (0.52)	0.043 (0.59)	0.028 (0.36)
Family close index	0.037 (1.43)	0.039 (1.43)	0.038 (1.47)	0.039 (1.44)	0.045 (1.73)	0.043 (1.59)
Unemployed	–0.095 (0.69)	–0.097 (0.68)	–0.087 (0.63)	0.099 (0.70)	–0.104 (0.75)	0.088 (0.62)
Self-employed	–0.045 (0.80)	0.005 (0.09)	–0.042 (0.76)	0.007 (0.11)	–0.035 (0.64)	0.010 (0.17)
Partner unemployed	–0.101 (0.72)	–0.025 (0.17)	–0.087 (0.62)	–0.020 (0.14)	–0.080 (0.57)	–0.014 (0.10)
log(total income)	–0.006 (0.25)	–0.035 (1.34)	–0.001 (0.01)	–0.033 (1.27)	–0.001 (0.03)	–0.033 (1.27)
log(total income ²)	0.001 (0.15)	0.004 (1.12)	–0.001 (0.16)	0.004 (1.02)	–0.001 (0.17)	0.004 (1.01)
Health index	0.023 (1.18)	–0.002 (0.10)	0.018 (0.92)	–0.004 (0.20)	0.020 (1.01)	–0.003 (0.14)
Happiness index	–0.006 (0.21)	–0.023 (0.78)	–0.001 (0.01)	–0.020 (0.69)	0.001 (0.03)	–0.020 (0.68)
Perceived support	0.149 (1.44)	0.117 (1.07)	0.139 (1.35)	0.113 (1.04)	0.141 (1.37)	0.113 (1.03)
Employed by a charity	0.254 (2.66) [#]	0.158 (1.53)	0.255 (2.67) [#]	0.160 (1.55)	0.273 (2.85) [#]	0.171 (1.65)
Attendance charity/voluntary	0.386 (11.89) [#]	0.224 (6.45) [#]	0.379 (11.66) [#]	0.222 (6.39) [#]	0.383 (11.75) [#]	0.226 (6.48) [#]
Attendance other club	0.188 (8.61) [#]	0.132 (5.71) [#]	0.184 (8.40) [#]	0.131 (5.65) [#]	0.182 (8.27) [#]	0.129 (5.59) [#]
Roman Catholic	0.861 (17.30) [#]	0.350 (6.35) [#]	0.860 (17.31) [#]	0.106 (6.37) [#]	–0.343 (0.65)	–0.391 (0.69)
Church of England	0.093 (2.56) [#]	0.108 (2.81) [#]	0.089 (2.47) [#]	0.351 (2.75) [#]	–2.174 (5.88) [#]	–1.387 (3.52) [#]
Methodist	0.243 (2.76) [#]	0.199 (2.15) [#]	0.245 (2.79) [#]	0.201 (2.17) [#]	–1.114 (1.09)	–0.613 (0.57)

Other and non-Christian	0.734 (6.28) [#]	0.590 (4.85) [#]	0.715 (6.11) [#]	0.583 (4.79) [#]	3.114 (2.77) [#]	1.615 (1.38)
Schooling × RC	–	–	–	–	0.097 (2.24) [#]	0.060 (1.29)
Schooling × COE	–	–	–	–	0.182 (6.15) [#]	0.120 (3.81) [#]
Schooling × methodist	–	–	–	–	0.109 (1.33)	0.065 (0.76)
Schooling × other NC	–	–	–	–	–0.185 (2.10) [#]	–0.079 (0.86)
LR $\chi^2(d)$	1141.93 ($d=29$)	2939.04 ($d=31$)	1167.54 ($d=29$)	2942.04 ($d=31$)	1216.70 ($d=33$)	2959.35 ($d=35$)
	$p=0.000$	$p=0.000$	$p=0.000$	$p=0.000$	$p=0.000$	$p=0.000$
Observations	6913					

Note: *T*-statistics are shown in parenthesis.

[#] Statistically significant at the 5% level or above (based on a two-tailed test).

al. (1997) and Brañas-Garza and Neuman (2003). Various arguments have been put forward to explain the finding that women appear to be ‘more religious’ than men. For example, it may be the case that the opportunity cost of time is lower for women due to lower wages and/or fewer employment opportunities. The finding may, on the other hand, be due to gender-based personality characteristics. Whilst the sign of the estimated coefficient on the gender dummy variable is consistent across the specifications, the size of the estimated coefficient is subject to a degree of variability. Once we control for past levels of church attendance, its influence becomes less pronounced.

Turning to the other personal characteristics, differences in church attendance across ethnic groups are apparent. Being black, for example, has a strong positive correlation with church attendance, which accords with the findings of Azzi and Ehrenberg. In accordance with the existing literature, marital status has a positive impact on church attendance. Individuals who are separated, widowed or divorced are also more likely to attend church. Similarly, the presence of pre-school children in the household is positively associated with church attendance whilst having older children exerts an insignificant influence.

We included a number of variables related to individuals’ perceptions about social networks such as whether the individual feels that he/she has someone to turn to for support and how close he/she feels the family is. These variables have an insignificant effect on church attendance. In contrast to Ellison, we find that the happiness index used to proxy life satisfaction and the health index are also insignificant. Our findings do, however, provide some support for the hypothesis of Sacerdote and Glaeser that church attendance is positively related to attendance at other formal group social activities. Moreover, these findings are highly significant and consistent across the six specifications.¹²

Our findings also suggest that economic status does not affect church attendance. In particular, unemployment, self-employment, total household income and having an unemployed partner are all insignificantly related to church attendance.

Finally, religious denomination is clearly an important determinant of church attendance with non-Christians and Roman Catholics being characterised by the largest positive and most statistically significant estimated coefficients. In specifications 5 and 6, however, when religious denomination is interacted with years of education, the Church of England denomination interaction is characterised by the largest positive influence.¹³

4.1.2. *Endogenous education*

In Table 4, we replace the highest educational qualification dummy variables and years of education with their predicted values as derived from the educational attainment equation (Eq. (2a)).¹⁴ Table 4 adopts the same format as Table 3 with six specifications reported. In general, our findings are unchanged; hence, for reasons of brevity we only comment on education and

¹² We also investigated the relationship between educational attainment and other forms of social engagement. This essentially involved specifying other measures of social attendance as the dependent variable, specifically attendance at political party meetings, charity and voluntary group meetings and attendance at women’s groups. In each model of social attendance, we found a positive and significant impact of education on attendance, in accordance with Sacerdote and Glaeser.

¹³ Differences in participation across religious denominations may reflect differences in the organizational structure of churches. Allen (1995) explores issues related to organizational structure.

¹⁴ For reasons of brevity, we do not present the results pertaining to the two educational attainment equations. In general, the two equations are well-specified and our findings accord with the existing literature and a priori expectations. For example, the pupil–teacher ratio is a significant determinant of educational attainment. Attending a grammar school has

past levels of religious activity. It is apparent from [Table 4](#) that the positive association between educational attainment and church attendance remains once we treat educational attainment as endogenous. Furthermore, the sizes of the estimated coefficients on education are now much larger.

Our findings contrast with those of Sander, for the U.S., who finds no causal effect of education on religious activities. In addition, past levels of religious activity continue to have a positive and strong correlation with current church attendance. In terms of the denomination interactions with years of schooling (i.e. specifications 5 and 6) the Church of England interaction once again dominates.¹⁵

4.2. Panel data results

[Table 5](#) presents our estimates of Eqs. (3a), (3b), (5a) and (5b) for the balanced panel data. We omit the explanatory variables related to past religious behavior as these become observations in the panel. In the first specification, it is apparent that educational attainment at all levels (with the exception of CSE) is positively associated with church attendance. Furthermore, the sizes of the estimated coefficients on the educational attainment variables increase with the educational attainment hierarchy. Our findings with respect to the predicted highest educational qualification confirm the positive association between church attendance and educational attainment.

Regardless of whether years of schooling are exogenous or endogenous, our findings once again support a positive relationship between education and religion. As in the cross-section analysis, when religious denomination is interacted with years of education, we find that the Church of England denomination interaction is characterised by a positive influence. In addition, there is limited support for the claim that individuals become more skeptical of faith-based claims as they acquire more education in science-based subjects.

The magnitude of ρ provides information pertaining to whether individuals are likely to report consistent levels of religious activity across the three time periods or whether religious activity is subject to variation over the individual's life cycle. It is apparent that ρ is significant in all specifications in [Table 5](#) and, furthermore, its magnitude indicates that levels of church attendance, are relatively consistent over time.¹⁶

To explore whether levels of church attendance vary less towards the later stages of an individual's life cycle, we split our panel of data into two periods: 1981 and 1991 (i.e. ages 23 and 33 years) and 1991 and 2000 (i.e. ages 33 and 42 years). We constructed two balanced panels of data, each with 13,668 observations. We then repeated the analysis of [Table 5](#) for each of the two periods. [Table 6](#) presents the values of ρ estimated for each of the 12 regressions, where its size

a positive impact on educational attainment. Family background is an important determinant of education; for example, parent's years of education and whether parents express an interest in their child's education are both positively associated with educational attainment. Ability, as proxied by test scores in Maths and English at ages 7, 11 and 16 years, has a positive effect on educational attainment. Full results are available from the authors on request.

¹⁵ We have also conducted the analysis in [Tables 3 and 4](#) for males and females separately. In general, the pattern of our results does not change. There are some interesting differences between the findings for men and women. For example, amongst men the positive association between past and current church attendance is much more pronounced. In addition, the impact of educational attainment on church attendance is greater for females than males; this is especially the case at higher levels of education. Full results are available from the authors.

¹⁶ The finding that the unobservable intra-individual effects are important in terms of size and statistical significance implies that there are efficiency gains to employing a random effects framework ([Baltagi, 2005](#)), and, hence, justifies our approach.

Table 5
The determinants of church attendance at ages 23, 33 and 42 years (panel estimates)

	Education exogenous	Education endogenous	Years of schooling exogenous	Years of schooling endogenous	Years of schooling + denomination interactions exogenous	Years of schooling + denomination interactions endogenous
Years of schooling	–	–	0.113 (15.39) [#]	0.409 (19.30) [#]	0.105 (9.85) [#]	0.356 (12.02) [#]
Higher degree	0.733 (7.45) [#]	–	–	–	–	–
Degree	0.613 (11.40) [#]	–	–	–	–	–
Diploma	0.513 (10.98) [#]	–	–	–	–	–
A levels	0.495 (8.32) [#]	–	–	–	–	–
O levels	0.258 (6.30) [#]	–	–	–	–	–
CSE	–0.069 (1.46)	–	–	–	–	–
Highest education index	–	0.233 (16.53) [#]	–	–	–	–
Science O/A level	–0.225 (1.76)	–0.211 (1.70)	–0.216 (1.69)	–0.277 (2.15) [#]	–0.209 (1.63)	–0.276 (2.15) [#]
Religion O/A level	0.698 (3.15) [#]	0.717 (3.21) [#]	0.667 (3.01) [#]	0.769 (3.50) [#]	0.675 (3.05) [#]	0.760 (3.46) [#]
Male	–0.469 (11.30) [#]	–0.519 (12.32) [#]	–0.496 (12.01) [#]	–0.520 (12.43) [#]	–0.497 (12.02) [#]	–0.519 (12.43) [#]
Disabled	–0.094 (2.22) [#]	–0.107 (2.52) [#]	–0.126 (2.98) [#]	–0.111 (2.61) [#]	–0.127 (3.00) [#]	–0.109 (2.58) [#]
Mixed race	0.258 (0.54)	0.432 (0.91)	0.144 (0.30)	0.390 (0.82)	0.119 (0.25)	0.368 (0.78)
Asian	1.310 (5.33) [#]	1.575 (6.15) [#]	1.292 (5.17) [#]	1.500 (5.84) [#]	1.278 (5.07) [#]	1.484 (5.78) [#]
Black	0.388 (1.22)	0.619 (1.78)	0.409 (1.28)	0.527 (1.54)	0.402 (1.26)	0.525 (1.55)
Married	0.232 (6.41) [#]	0.254 (6.98) [#]	0.226 (6.26) [#]	0.272 (7.47) [#]	0.227 (6.29) [#]	0.271 (7.43) [#]
Separated/widow/divorced	0.169 (2.93) [#]	0.208 (3.57) [#]	0.154 (2.68) [#]	0.235 (4.04) [#]	0.155 (2.70) [#]	0.233 (4.02) [#]
Household size	0.058 (5.00) [#]	0.058 (4.99) [#]	0.056 (4.87) [#]	0.060 (5.16) [#]	0.056 (4.87) [#]	0.060 (5.19) [#]
Children 0–6	0.335 (11.28) [#]	0.346 (11.64) [#]	0.335 (11.34) [#]	0.341 (11.45) [#]	0.334 (11.29) [#]	0.339 (11.41) [#]
Children 5–16	0.139 (4.46) [#]	0.144 (4.59) [#]	0.115 (3.69) [#]	0.151 (4.81) [#]	0.113 (3.63) [#]	0.150 (4.80) [#]
Unemployed	0.072 (0.99)	0.078 (1.06)	0.062 (0.85)	0.075 (1.02)	0.062 (0.86)	0.073 (0.99)
Self-employed	0.167 (3.36) [#]	0.162 (3.23) [#]	0.156 (3.13) [#]	0.151 (3.02) [#]	0.156 (3.12) [#]	0.151 (3.02) [#]
Partner unemployed	–0.221 (2.47) [#]	–0.214 (2.37) [#]	–0.227 (2.55) [#]	–0.202 (2.25) [#]	–0.225 (2.53) [#]	–0.203 (2.26) [#]
log(total income)	0.012 (0.64)	0.001 (0.07)	0.016 (0.82)	0.011 (0.57)	0.016 (0.82)	0.011 (0.58)
log(total income ²)	0.003 (0.98)	0.006 (1.88)	0.002 (0.86)	0.004 (1.12)	0.003 (0.85)	0.003 (1.09)
Health index	0.054 (2.94) [#]	0.042 (2.23) [#]	0.058 (3.14) [#]	0.035 (1.91)	0.057 (3.11) [#]	0.035 (1.91)
Roman Catholic	2.037 (35.26) [#]	2.092 (35.61) [#]	2.032 (35.23) [#]	2.101 (36.03) [#]	2.569 (9.68) [#]	2.198 (3.12) [#]
Church of England	1.009 (28.69) [#]	1.005 (28.31) [#]	1.006 (28.67) [#]	1.006 (28.41) [#]	0.632 (3.56) [#]	–0.336 (0.80)
Methodist	1.256 (14.33) [#]	1.244 (14.04) [#]	1.259 (14.37) [#]	1.247 (14.22) [#]	1.161 (2.50) [#]	0.320 (0.27)

Other and non-Christian	1.124 (16.40) [#]	1.081 (15.73) [#]	1.120 (16.39) [#]	1.082 (15.76) [#]	0.614 (1.64)	0.856 (1.01)
Schooling × RC	–	–	–	–	–0.043 (2.10) [#]	–0.009 (0.16)
Schooling × COE	–	–	–	–	0.030 (2.18) [#]	0.111 (3.20) [#]
Schooling × methodist	–	–	–	–	0.008 (0.22)	0.076 (0.79)
Schooling × other NC	–	–	–	–	0.040 (1.37)	0.019 (0.27)
ρ	0.593 (56.56) [#]	0.604 (59.61) [#]	0.593 (56.88) [#]	0.598 (58.23) [#]	0.593 (56.70) [#]	0.596 (57.80) [#]
LR $\chi^2(d)$	2905.52 ($d=28$)	2907.26 ($d=23$)	2854.26 ($d=23$)	3013.59 ($d=23$)	2869.62 ($d=27$)	3025.34 ($d=27$)
	$p=0.000$	$p=0.000$	$p=0.000$	$p=0.000$	$p=0.000$	$p=0.000$
Observations	20502					

Note: *T*-statistics are shown in parenthesis.

[#] Statistically significant at the 5% level or above (based on a two-tailed test).

Table 6
Panel sample split across time

	Education exogenous	Education endogenous	Years of schooling exogenous	Years of schooling endogenous	Years of schooling + denomination interactions exogenous	Years of schooling + denomination interactions endogenous
1981 and 1991 (ages 23 and 33 years)						
ρ	0.564 (36.54) [#]	0.572 (37.23) [#]	0.555 (35.57) [#]	0.571 (37.04)	0.556 (35.67) [#]	0.570 (36.92) [#]
Observations	13668					
1991 and 2000 (ages 33 and 42 years)						
ρ	0.644 (52.82) [#]	0.651 (54.99) [#]	0.645 (52.29) [#]	0.648 (54.07)	0.642 (52.57) [#]	0.644 (53.22) [#]
Observations	13668					

Note: T-statistics are shown in parenthesis.

[#] Statistically significant at the 5% level or above (based on a two-tailed test).

is much larger in the later period. This suggests that as individuals age, there is less variation in church attendance, supporting the notion that church attendance varies less at later stages of the life cycle.

5. Conclusion

The purpose of this paper has been to investigate the relationship between educational attainment and church attendance. Our empirical results support a positive association between education and church attendance that remains when we specify a comprehensive educational attainment equation to control for endogeneity bias. Additionally, our findings suggest that current participation in religious activities is positively associated with past religious activities. Moreover, levels of religious activity tend to vary less over time, suggesting that factors such as habit formation are important. Finally, as pointed out by Sacerdote and Glaeser, the positive association between education and church attendance indicates that education plays an important role in social involvement. Such findings may aid governments in shaping policies to alleviate social exclusion.

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