

Attitudes to Evolution amongst Christians, Muslims and the Non-Religious in Britain: Differential Effects of Religious and Educational Factors

Journal:	<i>PUBLIC UNDERSTANDING OF SCIENCE</i>
Manuscript ID	PUS-17-0030.R2
Manuscript Type:	Theoretical/ research paper
Keywords:	evolution, science and religion, media and science, public understanding of science, science education, science in schools, creationism, Christian, Muslim, non-religion
Abstract:	<p>According to poll results and media reports, Britain has a significant and growing number of creationists. However, little scholarly research has been carried out to explore this phenomenon. We present results from a national survey of 6020 individuals to give a comprehensive picture of contemporary public attitudes to evolution in Britain. Furthermore, we explore the effects of religion and education on attitudes to evolution. Unique to this study, we analyse the effects of attending a religiously-affiliated school ("faith school") on acceptance of evolutionary theory. We examine these effects in the general population, and additionally, across different Christian, Muslim and non-religious subpopulations. Results give strong evidence that the number of creationists has been overstated previously. We find the effect of education is complex and varies between different religious groups, but that faith school attendance is associated with more acceptance of evolution for people belonging to groups that tend to reject it.</p>

Attitudes to Evolution amongst Christians, Muslims and the Non-Religious in Britain: Differential Effects of Religious and Educational Factors

Abstract

According to poll results and media reports, Britain has a significant and growing number of creationists. However, little scholarly research has been carried out to explore this phenomenon. We present results from a national survey of 6020 individuals to give a comprehensive picture of contemporary public attitudes to evolution in Britain. Furthermore, we explore the effects of religion and education on attitudes to evolution. Unique to this study, we analyse the effects of attending a religiously-affiliated school (“faith school”) on acceptance of evolutionary theory. We examine these effects in the general population, and additionally, across different Christian, Muslim and non-religious subpopulations. Results give strong evidence that the number of creationists has been overstated previously. We find the effect of education is complex and varies between different religious groups, but that faith school attendance is associated with more acceptance of evolution for people belonging to groups that tend to reject it.

Introduction

Headlines such as “*Academics fight rise of creationism*”, “*Why is creationism on the rise, and does it have a place in education?*” and “*Children ‘indoctrinated’ by lessons in creationism*” (Campbell, 2006; Bland, 2008; Paton, 2014) point to recurring concerns over rejection of evolution in Britain, which is somewhat surprising given that the country has experienced significant declines in both religious belief and practice over the past few decades (Brown, 2009; Voas and Crockett, 2005). Creationism is usually understood to mean religiously-motivated rejection of evolutionary theory, and, until recently, this was considered to be almost exclusively a feature of North American fundamentalist Christianity. However, it is believed that creationism has now “spread from America throughout the world” and found a home within diverse religious traditions (Numbers, 2006). There is a substantial literature on creationism in the US (for a recent review, see Pobiner (2016)) but little scholarly research on public attitudes to evolution in other national contexts, a point which has been highlighted by Blancke et al in a review article on creationism in Europe (Blancke, 2013).

We begin to fill that gap here by presenting results from a detailed study of evolution acceptance and rejection in Britain. Previous polls surveying public acceptance of

1
2
3 evolutionary theory in both the US and the UK have received criticism for providing
4 inadequate measures of evolution acceptance, and we seek to address those methodological
5 issues.
6
7

8 Given that there are no longitudinal datasets surveying attitudes to evolution in
9 Britain, we instead designed our study to take into account recent religious changes in the
10 country, and accordingly analyse six different religious groups: the two historically largest
11 religious traditions (Anglican and Catholic Christianity) and four groups currently showing
12 growth (Non-Religion, Islam, independent/non-denominational Evangelical Christianity and
13 Pentecostal Christianity).
14
15
16
17

18 We create a multipoint scale of evolution acceptance to investigate which factors best
19 predict evolution acceptance or rejection, and examine how educational and religious social
20 factors may differentially influence acceptance of evolution in Britain. Furthermore, we
21 investigate whether these effects differ significantly across the different religious groups
22 surveyed.
23
24
25

26 Results from this study add to the growing body of evidence demonstrating that the
27 simple provision of more education about evolution to address the public's "deficit" of
28 knowledge may not be successful. Instead, the specific educational setting seems to be
29 significant, a finding that should be of interest to education professionals and policymakers,
30 particularly those in urban areas with large religiously active populations.
31
32
33
34
35

36 **Public opinion polls about evolution in the US and the UK**

37 Most of the literature concerning public attitudes to evolution is based on studies carried out
38 in the United States. The widely-cited Gallup poll has been conducted periodically since
39 1982 and offers three response categories regarding attitudes to creation and evolution: 1)
40 young earth creationism (God created human beings pretty much in their present form at one
41 time within the last 10,000 years or so), 2) God-guided evolution (human beings have
42 developed over millions of years from less advanced forms of life, but God guided this
43 process) or 3) Evolution without God (Human beings have developed over millions of years
44 from less advanced forms of life, but God had no part in this process). The percentage of the
45 US population who choose the 'young earth creationism' option has remained fairly stable
46 over the years, at between 42 and 47% (Newport, 2014).
47
48
49
50
51
52
53
54

55 Unlike the Gallup poll in the US, there are unfortunately no longitudinal studies in the
56 UK surveying public acceptance of evolution, so it is not possible to say whether attitudes to
57 evolution have changed over time. A number of polls conducted in the last decade give us
58
59
60

1
2
3 snapshots of the British public's attitudes to evolution (IpsosMORI, 2006; Lawes, 2009;
4 Eurobarometer, 2005; Elsdon-Baker, 2015), but no studies have been conducted to explore
5 which factors best predict acceptance or rejection of evolution within the general population.
6
7

8 Depending on the way the question is asked, and how the different response
9 categories are defined, the percentage of people reported to accept evolution in Britain varies
10 considerably, ranging between 38% (Elsdon-Baker, 2015) and 79% (Eurobarometer, 2005),
11 whilst the percentage of "creationists" ranges between 9% (YouGov, 2013) and 22%
12 (BBCNews, 2006; IpsosMORI, 2006). The most detailed poll on evolution in Britain to date
13 was commissioned by the thinktank Theos and reported that opinion was often "confused and
14 contradictory" (Lawes, 2009).
15
16
17
18

19 Most of the polls offer a limited number of pre-determined response categories, which
20 tend to package together beliefs about God, evolution, and the age of the earth in
21 combinations that may not accurately represent many people's knowledge and/or beliefs. For
22 example, the Gallup poll question classifies all people who reject evolution as young earth
23 creationists and all non-theists as adhering to the consensus position of scientists, old earth
24 evolution.
25
26
27
28

29 This type of problem was highlighted in a review of social scientific literature, which
30 found that an assumption of epistemological conflict between religion and science is present
31 in many studies (Evans and Evans, 2008). Bader and Finke found that responses to questions
32 about human origins vary considerably, depending on factors such as the ordering of
33 questions, how the answer categories are phrased, and whether the answer categories offered
34 are mutually exclusive and exhaustive (Bader and Finke, 2014). The framing of poll
35 questions about evolution has also been extensively critiqued by Elsdon-Baker who points
36 out that polls often present "an overly simplistic binary choice – either you accept
37 evolutionary science *or* a creator God" (Elsdon-Baker, 2015). A recent US study tackled this
38 methodological issue by disaggregating the components of common survey questions about
39 human origins (Hill, 2014).
40
41
42
43
44
45
46
47

48 Results from these types of polls have led some to conclude that there are large
49 numbers of people who subscribe to young earth creationism, for example Richard Dawkins
50 writes: "More than 40% of Americans deny that humans evolved from other animals, and
51 think that we – and by implication all of life – were created by God within the last 10,000
52 years. The figure is not quite so high in Britain, but it is still worryingly large." (Dawkins
53 2010: 430)
54
55
56
57
58
59
60

Predictors of evolution rejection

Studies in the US consistently show that four main factors are related to acceptance of evolution: religiosity, education, age and political party affiliation (Pobiner, 2016; Miller et al., 2006; Haider-Markel and Joslyn, 2008; Baker, 2012; Baker, 2013; Rivers, 2006).

Frequent church attendance, increased age and Republican party affiliation are all positively correlated with young earth creationism; whereas higher levels of education are positively correlated with theistic or secular evolutionary views (Pobiner, 2016). Far less is known about the factors related to evolution acceptance or rejection in other national contexts, including Britain. This raises the question of whether factors predictive of evolution rejection in the US are generalizable beyond that particular context.

Most studies treat religion and education as separate variables, which largely makes sense in the United States, given that it is a country with a large religiously active population but a constitution that enshrines separation of religion and state. This means that American public schools – in which over 90% of the population receive their schooling – cannot be religiously affiliated. In contrast, Britain, like many European countries, has a national church and religiously-affiliated state-funded schools – but a much smaller religiously-active population. It has been said that religion in Europe “does not function as a separate channel of culture but as a distinctive current which mingles in the mainstream” (Berger et al., 2008). This leads us to ask not only the effect of religious service attendance and of education on evolution acceptance in Britain; but to also ask: is there an effect on evolution acceptance when a religiously-affiliated school is the context for education about science?

The British school system and the teaching of evolution

A major contribution of this study is therefore to investigate whether type of secondary school attended, that is, either a religiously-affiliated “faith school” or a secular school, is predictive of evolution acceptance or rejection. Bearing in mind that the impact of a variable such as education depends on the specificities of the local context (Blancke, 2013), we provide here some relevant information about the secondary schooling system in Britain.

Over 90% of school pupils in the UK are educated in state-funded schools, some of which have a religious affiliation (commonly referred to as “faith schools”), and some which do not. As of September 2015, 37% of all state-funded primaries were faith schools (mainly Church of England) and 19% of all state-funded mainstream secondaries were faith schools (mainly Catholic) (Long and Bolton, 2015). Since 1998, a handful of Muslim, Sikh and Hindu state-funded schools have opened (Long and Bolton, 2015).

1
2
3 Until recently, all state-funded schools in England and Wales were required to follow
4 a National Curriculum, first introduced in 1989, which clearly states that evolution must be
5 taught in science lessons, although it did not explicitly ban the teaching of creationism. But
6 newer 'Academy' schools, which are state-funded but privately sponsored and governed by
7 independent organisations such as charities, businesses and faith groups, are not required to
8 follow the National Curriculum, although they do offer nationally recognized qualifications
9 and therefore teach to the exam board syllabuses. Concern has been raised that creationism
10 has been, or could be taught in faith-based Academy schools, the details of which are
11 described elsewhere (Allgaier, 2014; Williams, 2008).
12
13
14
15
16
17

18 Most faith schools that are not Anglican or Catholic church schools are private
19 independent schools that are not funded by the state and are not required to follow the
20 National Curriculum. However, the majority of these offer nationally-recognised
21 qualifications and therefore, like academy schools, teach to the exam board syllabuses.
22
23
24
25

26 **Religious traditions and religious change in Britain**

27
28 Research from the United States shows that individuals from some religious traditions are
29 much less likely to accept evolution than others. Such detailed data has not previously been
30 available for Britain because fewer studies have been carried out and because, due to a
31 smaller population and much lower levels of religiosity, accurate statistics are not available
32 for many religious groups.
33
34
35

36 The religious landscape in Britain has seen significant shifts over the past few
37 decades, and these changes are linked to some of the concerns about a rise in creationism.
38 The number of people in Britain who identify with non-Christian religions has increased,
39 with Muslims now accounting for 4.8 per cent of the population, an increase from 3.0% in
40 2001. Other non-Christian religions together account for 4% of the population (ONS, 2012).
41 Concern about Islamic creationism has been voiced in the mainstream media (e.g. (Gardham,
42 2008; BBCNews, 2011) and in scientific publications (Hameed, 2008; Koenig, 2001; Curry,
43 2009; Graebisch and Schiermeier, 2006). However, there is very little empirical data available
44 concerning attitudes to evolution amongst Muslims in Britain.
45
46
47
48
49
50

51 The number of people who report they have no religion has increased in Britain,
52 whilst the oldest and largest organized religions in Britain – Anglican and Catholic
53 Christianity – have experienced significant declines in the past few decades. Currently 19.5%
54 of the British population identify as Anglican, and 8.8% identify as Catholic (British Social
55 Attitudes 2009-2013).
56
57
58
59
60

1
2
3 Against a backdrop of general decline in Christianity, growth is reported amongst
4 Pentecostal churches (currently attended by around 0.7% of the British population) and what
5 we hereafter refer to as “Independent Evangelical” churches, a category consisting of free,
6 independent and non-denominational evangelical churches (currently attended by around
7 0.6% of the population) (Brierley, 2014).
8
9

10
11 One study reveals that amongst churchgoers in England, denomination is a significant
12 predictor of evolution rejection, with Pentecostals and Evangelicals more likely to reject
13 evolution than Anglicans or Methodists (Village and Baker, 2013). Allgaier (2014) speculates
14 that the higher levels of creationist beliefs found in London relative to the rest of Britain are
15 due to the large numbers of African and African-Caribbean Pentecostal churches in London
16 (Allgaier, 2014).
17
18
19
20

21 However, no previous studies examine attitudes to evolution amongst these different
22 religious and non-religious groups in Britain; nor do previous studies compare predictive
23 factors associated with evolution acceptance and rejection across all these different groups.
24
25
26
27

28 **Research questions**

29 In this paper, we set out to address a number of specific questions which we believe will
30 contribute to the existing literature.
31
32

33 First, we build on previous poll data to present a more comprehensive picture of
34 attitudes to evolution in Britain by designing a survey instrument that covers a number of
35 different beliefs related to evolutionary theory and various forms of “creationism”. We
36 therefore include items covering plant and animal evolution, human evolution, age of the
37 earth, descent from Adam and Eve, and whether natural processes can account for the
38 complexity of life. By including each of these as separate items, we avoid creating categories
39 that make assumptions about the combinations that people might select.
40
41
42
43
44

45 Secondly, we build on previous research to explore the effects of religion and
46 education on acceptance of evolution within the general population, and how these two
47 variables interact with each other. Furthermore, we include a variable for the specific type of
48 secondary school attended (religiously affiliated or not). Important controls are frequency of
49 service attendance age 11 or 12 (as a proxy for religious upbringing), participation in
50 supplementary religious education, general education level, specific education in biology or
51 evolution, and a number of sociodemographic control variables.
52
53
54
55

56 Thirdly, we examine the effects of these factors across six specific subpopulations:
57 Anglicans and Catholics, the historically largest religious groups; and Muslims, Pentecostals,
58
59
60

1
2
3 Independent Evangelicals and the Non-Religious, four groups which are currently showing
4 growth in Britain.
5

6 We hope that, taken together, these data will provide some insight into the question of
7 whether or not there is a rise in creationism in Britain, and if so, what the reasons might be.
8
9

10 11 **Data and methods**

12 13 *Survey Instrument*

14
15 The survey questions about evolution were developed with the aim of better representing the
16 general public's views on evolution. Participants responded to a series of statements about
17 evolution using a five-point Likert scale instead of being required to select from a limited
18 choice of pre-determined categories.
19
20
21
22
23

24
25 TABLE 1 HERE
26

27 *Sample*

28 We commissioned the polling company YouGov to conduct a survey of a nationally
29 representative sample of the British population, which was undertaken in August
30 2014. YouGov use a purposive active sampling methodology to select subsamples from their
31 online access panel of more than 360,000 British adults that are nationally representative of
32 British adults in terms of age, gender, social class and newspaper readership (see (Rivers,
33 2006; Twyman, 2008)). Only individuals in the selected subsample of the panel are invited to
34 take the survey. Respondents are not given the subject of the survey when invited to take part
35 and an incentivisation system helps ensure that people who are not interested in the subject
36 nonetheless complete the entire survey. YouGov weight the final data by age, gender, social
37 class, region, level of education and how respondents voted at the previous election to the
38 national profile of all adults aged 18+ (including people without internet access). There has
39 been much discussion recently about the use of online nonprobability samples, but a recent
40 study by the Pew Research Center suggests that probability samples are not necessarily
41 superior to nonprobability samples, mainly due to the high nonresponse rates seen in
42 probability-based surveys (Kennedy et al., 2016). The Pew study also found that there were
43 considerable differences between different vendors' nonprobability samples, with YouGov's
44 sample performing best (Rivers, 2016).
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

1
2
3 In addition to a nationally representative sample, there was oversampling of five
4 different religious affiliations: 1) Anglicans (or Episcopalians) 2) Catholics 3) Muslims 4)
5 Pentecostal Christians and 5) Independent Evangelical Christians. Oversampling of the
6 religious groups was achieved by using responses to a pre-screening question: Do you regard
7 yourself as belonging to any particular religion? [If yes] Which of these do you belong to?
8 Answer categories included: Church of England/Anglican/Episcopal; Roman Catholic;
9 Pentecostal (e.g. Assemblies of God, Elim Pentecostal Church, New Testament Church of
10 God, Redeemed Christian Church of God); Evangelical – independent/non-denominational
11 (e.g. FIEC, Pioneer, Vineyard, Newfrontiers); and Islam/Muslim. Although African
12 Pentecostalism has received much attention in the literature recently, it should be noted here
13 that 56% of the Pentecostal sample give their ethnicity as White British.
14
15
16
17
18
19
20

21 The five religious samples were weighted for age, gender and social class¹ and pooled
22 with the nationally representative sample. For whole sample analyses, cases were weighted
23 for religious group to ensure that the proportions in our ‘whole sample’ matched the
24 proportions of those religious groups found within the adult population at large (Anglican
25 19.5%; Catholic 8.76%; Muslim 3.9% (age 18+); Pentecostal Christian 0.7%; Independent
26 Evangelical Christian 0.6%; All others 65.64%. Source: BSA 2009-2013 and English Church
27 Census 2005)).
28
29
30
31
32

33 In order to identify a genuinely secular category for comparative purposes, cases were
34 allocated to the “Non-Religious” category on the basis of both affiliation (no religious
35 affiliation) and attendance (attendance at religious services about once or twice a year or
36 less). All other cases were allocated to an “Other” category, which cannot itself be analyzed
37 but is necessary to ensure proper composition of the religious groups which are used in the
38 analyses. Although using online access panels falls short of the ideal for generating samples
39 of the minority religious groups under study, it would have been prohibitively expensive to
40 generate new probability samples for this survey.
41
42
43
44
45
46
47

48 *Measures*

49 50 51 *Dependent Variable.*

52 The responses to the eight Likert-scale items presented in Figure 1 reveal that public attitudes
53 to evolution are complex and cannot be measured satisfactorily with a single dichotomous
54 measure. Factor analysis of the eight variables produces somewhat different results for each
55 religious group. What all of the results share, however, is a high loading of items 2, 3 and 5
56
57
58
59
60

1
2
3 (in italics in Table 1) on the primary factor². The dimension identified in this way also
4 corresponds closely with a biological understanding of evolutionary theory³ and omits items
5 that are specific only to particular religious traditions. Because additive scales generally have
6 higher validity and increased reliability compared to single dichotomous measures, we
7 created an additive, unidimensional scale of biological evolution acceptance – hereafter
8 referred to as ‘EvoScale’ – that combines responses to items 2, 3 and 5. We use this scale as
9 the dependent variable in regression analyses. Each item for EvoScale was recoded as
10 follows: Strongly agree = 2, Agree = 1, Neither agree nor disagree = 0, Disagree = -1 and
11 Strongly disagree = -2. The three items were summed to produce a scale ranging from -6 to
12 +6. Cronbachs Alpha for the scale is .898 for the whole sample⁴.
13
14
15
16
17
18
19
20

21 *Independent Variables.*

22 Religion:

23 Religiosity was assessed using measures of religious affiliation (see Sample section above)
24 and religious participation. Religious participation was measured using a standard question
25 for frequency of religious service attendance, and was treated as a continuous variable. We
26 included frequency of salah prayer (five daily prayers) as an additional measure of religiosity
27 for Muslims, recognizing that mosque attendance is strongly related to gender and does not
28 measure Muslim piety in the way that church attendance measures Christian piety (El-
29 Menouar, 2014). Salah prayer frequency for all non-Muslims was coded as 1 = never perform
30 salah prayer. We did not include a variable for belief in God in our regression model because
31 we wished to examine socialization effects on attitudes to evolution, rather than using beliefs
32 to explain other beliefs.
33
34
35
36
37
38
39
40

41 Religious upbringing was assessed using two questions: Firstly using a variant of the
42 standard attendance question: What about when you were around eleven or twelve, how often
43 did you attend religious services then? And secondly, by asking respondents whether they
44 had participated in supplementary religious education age 18 or under: ‘Did you regularly
45 attend evening/weekend religious classes or activities when you were growing up? (e.g.
46 Sunday School, Catechism Classes, Madrased, Youth Programme etc) If so, at approximately
47 what ages did you start and finish attending these?’ The number of years spent in
48 supplementary religious education was calculated and coded into four categorical variables:
49 Never; 0-5 years; 6-10 years; and 11-18 years, which were then coded as binary variables
50 using ‘Never’ as the reference group.
51
52
53
54
55
56
57
58
59
60

1
2
3 Education:

4 The YouGov education variable records the highest level of educational qualification that
5 respondents have attained. This information was recoded into four categories: 1=No formal
6 qualifications 2=School qualifications 3=Undergraduate and 4=Postgraduate and then coded
7 as binary variables using Group 2 (School qualifications) as the reference group.
8
9

10
11 The religious affiliations of their secondary school were coded as binary variables
12 (Anglican, Catholic, Independent Christian, Islamic, Jewish, Hindu and Other) using 'No
13 Religious Affiliation' as the reference group. Country of secondary school attendance was
14 coded as a binary variable, Attended school in UK (age 11-16) = 1.
15
16

17
18 Binary variables were created for Studied Biology at A-Level (age 16-18), Studied
19 Biology at University, and Studied Evolution at University.
20
21

22 Sociodemographic data ⁵:

23 Age and household income were coded as continuous variables. Gender was coded as a
24 binary variable with male = 1. Children in household was coded as a binary variable with one
25 or more children = 1. Marital status was coded as a binary variable with Never Married = 1.
26
27 Partisanship was coded as a binary variable with Voted Conservative (in 2010 election) = 1.
28
29
30
31

32 **Results:**

33
34
35
36 FIGURE 1 HERE

37
38 The results from the eight Likert-scale items about evolution are shown as bar charts in
39 Figure 1. The first bar shows data for the whole sample, followed by data for each of the
40 different religious affiliations under study: the Non-Religious, Anglicans, Catholics,
41 Muslims, Pentecostals and Independent Evangelicals. The Non-Religious category consists of
42 individuals who express no religious affiliation and who only attend religious services about
43 once or twice a year or less.
44
45
46
47

48 Results for the whole sample show that 77.8% agree or strongly agree that plants and
49 animals have evolved from simpler life forms, with only 6.5% actively disagreeing with the
50 statement. Levels of acceptance of human evolution, as we might expect, are a little lower:
51 66.1% strongly agree or agree that humans evolved from non-human life forms, a figure
52 similar to that obtained in the Theos survey (Lawes, 2009). Although the percentages are
53 higher, the same pattern is evident amongst the Non-Religious group too: 84.1% accept plant
54 and animal evolution whereas only 75% accept human evolution. Anglicans are virtually
55
56
57
58
59
60

1
2
3 indistinguishable from the Non-Religious for these two survey items (85.8% accept animal
4 and plant evolution; 72.6% accept human evolution), whilst acceptance amongst Catholics is
5 just slightly lower at 80.3% and 63.6% respectively. Acceptance is lowest amongst
6 Pentecostals, followed by Independent Evangelicals, then Muslims. In the whole sample,
7 69.1% agreed that there is strong, reliable evidence to support the theory of evolution, with
8 only 3.3% disagreeing.

9
10
11
12
13 What about those who reject evolution? In the whole sample, 11.6% disagree or
14 strongly disagree with human evolution, whilst 6.5% reject plant and animal evolution.
15 Rejection of human evolution is highest amongst the Independent Evangelical and
16 Pentecostal Christian groups (who together make up just over 1% of the population),
17 followed by Muslims – although a large proportion (28.9%) of Muslims opt for the ‘neither
18 agree nor disagree’ category. 3.8% of the whole sample appear to subscribe to the ‘human
19 exceptionalist’ view of evolution (see (Miller et al., 2006; Elsdon-Baker, 2015)) – that is,
20 accepting the evolution of plants and animals whilst rejecting human evolution. 12.5% of
21 Pentecostals, 12.6% of Independent Evangelicals, 10% of Muslims, 4.2% of Anglicans, 6.3%
22 of Catholics and 2.0% of Non-Religious hold this view.

23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
Only 4.8% of respondents in the current study reject the notion of an ancient earth
that is billions of years old whilst, rather inconsistently, 6.1% agree with the idea of a young
earth less than 10,000 years old. A slightly higher proportion of 10.6% agreed that the world
was created in six 24-hour days. A cross-tabulation (not shown) of the question about human
origins with the question about a young earth shows that although 6.1% of respondents could
be classified as “young earthists”, only 2% could rightly be called “young earth creationists”,
that is, they accept the idea of a young earth less than 10,000 years old *and also* reject human
evolution. A slightly higher figure of 4.2% agree that the world was created in six 24-hour
days and also reject human evolution.

These figures are interesting because they show that the proportion of respondents
who hold some sort of consistent Young Earth Creationist position is very much lower than
the 17% or 22% of respondents opting for the Young Earth Creationism category in the
Theos survey (Lawes, 2009) or the BBC Horizon survey (BBCNews, 2006) respectively. A
further point to note is that a large proportion of the whole sample (one-third) select ‘neither
agree nor disagree’ in response to the age of the earth questions, and that similar proportions
select this response across all religious groups and also the non-religious group. General
education levels are lower amongst those who ‘neither agree nor disagree’ that the earth is
billions of years old, with a smaller proportion having university-level qualifications (38.6%),

1
2
3 compared with those who reject an ancient earth (47.3%), and those who accept an ancient
4 earth (53.1%). These observations suggest that it is largely lack of knowledge rather than
5 religiosity that accounts for the uncertainty regarding the age of the earth. The proportion of
6 people who confidently hold a consistent “old earth evolutionist” position – actively
7 accepting plant and animal evolution, human evolution and an earth that is billions of years
8 old – is relatively low at 50% of the whole population. Even amongst the Non-Religious,
9 only 58% confidently hold an “old earth evolutionist” position; presumably this figure has
10 little or nothing to do with religious beliefs amongst this population but simply reflects a lack
11 of knowledge. It is also a little surprising that amongst the Non-Religious group (bearing in
12 mind that our categorization for the Non-Religious was fairly stringent, based on both
13 religious affiliation *and* frequency of religious service attendance), only 66.7% disagree that
14 the world was created in six 24 hour days, 70% disagree that the whole human race is
15 descended from Adam and Eve and 50.3% disagree that life is too complex to have evolved
16 solely by natural processes.
17

18 Although 66.1% of the whole sample agree that humans evolved from non-humans,
19 only 54.9% disagree that the whole human race is descended from Adam and Eve. Cross-
20 tabulation shows that 6.2% of the sample accept human evolution *and* agree that the human
21 race is descended from Adam and Eve. Belief in an ancestral Adam and Eve is particularly
22 high amongst Pentecostal, Independent Evangelical and Muslim groups.
23
24

25
26
27
28
29
30
31
32
33
34
35
36 TABLE 2 HERE Descriptive statistics for Evoscale.
37

38
39 We used EvoScale (see Methods for details) as the dependent variable in an OLS linear
40 regression model ⁶. Descriptive statistics for EvoScale are shown in Table 2 and descriptive
41 statistics for the independent variables are available in Table S1 in supplementary online
42 information. The groups with the lowest mean EvoScale scores are Pentecostal followed by
43 Independent Evangelical Christians; these values are negative, indicating, on average, a
44 rejection of evolution in these groups. The mean score for Muslims is close to zero, whilst
45 Anglicans, Catholics and the Non-Religious all have a positive mean score.
46
47
48
49
50

51
52
53 TABLE 3 HERE
54

55 The linear regression model discussed in the following paragraphs is shown in Table 3. It
56 should be noted that the model shown includes interaction effects between religiosity
57
58
59
60

1
2
3 (frequency of religious service attendance) and education level; however, the main effects in
4 the absence of this interaction will also be described in the text.
5

6 Within the whole sample, the religious affiliations that are significantly predictive of
7 a lower evolution acceptance score (using the Non-Religious as the reference category) are
8 Pentecostals, Independent Evangelicals and Muslims – three religious groups that are
9 currently showing growth. But the group that has shown the most growth over the past
10 decades, the Non-Religious, has the highest mean evolution score.
11
12

13 When the Religiosity*Education interaction is omitted (data not shown), for the
14 whole sample we see that possession of university-level qualifications is predictive of a
15 higher evolution score, whilst a lack of formal qualifications predicts a lower score. This
16 same pattern is seen amongst the Non-Religious, Anglicans and Catholics; however general
17 education level is not a significant factor for Muslims, Pentecostals or Independent
18 Evangelicals. Some of these significant main effects are absorbed by the
19 Religiosity*Education interaction.
20
21
22
23
24
25

26 Frequency of religious service attendance is a large significant predictor of evolution
27 rejection for the whole sample, and amongst most of the religious groups. In the absence of
28 the Religiosity*Education interaction, the effect is particularly strong amongst Independent
29 Evangelicals and Pentecostals, the two religious affiliations associated with the lowest mean
30 evolution scores.
31
32
33

34 The interaction between Religiosity and Education is not significant in the whole
35 sample, but it is highly significant amongst Anglicans and Muslims ⁸, and also significant
36 amongst Catholics and Pentecostals ⁷. Simple slopes analysis reveals that for Anglicans, low
37 education has an especially negative effect on EvoScore, but at high levels of education,
38 degree of religiosity is associated with only small differences in EvoScore. A similar effect
39 is seen for Catholics. For Muslims the situation is reversed. At low levels of education,
40 religiosity makes little difference to acceptance of evolution. At high levels of education,
41 however, EvoScore diverges with religiosity. Muslims who are highly educated but not very
42 religious are likely to accept evolution. Those who are highly educated and also highly
43 religious are especially likely to reject it.
44
45
46
47
48
49
50

51 Biology education at A-Level (post-16) predicts a higher score only for Catholics and
52 Evangelicals, whilst university-level Biology is not a significant predictor for any group,
53 because all variation is predicted instead by the variable Studied Evolution at university,
54 which is significant across all groups except Independent Evangelicals.
55
56
57
58
59
60

1
2
3 Attending school in the UK (age 11-16) predicts a higher EvoScore within the whole
4 sample, which is unsurprising given that secondary education is compulsory, available free of
5 cost, and, at least in recent decades, almost certainly includes teaching of evolutionary theory.
6 The Pentecostal and Muslim groups contain the largest proportions of people who did not
7 receive secondary education in the UK (26% and 28% respectively), the majority of whom
8 will be first-generation immigrants. For Pentecostals, attending secondary school in the UK is
9 one of the largest positive predictors of a higher EvoScore; however, for Muslims this
10 variable is insignificant.
11
12
13
14
15

16 Given the current debates surrounding the teaching of evolution following recent
17 changes in government education policy, it is of considerable interest to examine whether
18 schooling in a “faith school” is predictive of evolution acceptance score (unweighted counts
19 in brackets). Amongst the whole population, attendance at an Islamic ($n = 204$) school
20 compared to attendance at a school with no religious affiliation predicts higher acceptance of
21 evolution even though Muslims as a group score lower than the whole population. Amongst
22 Muslims ($n = 803$), attendance at an Islamic school ($n = 166$) is the largest predictor of a
23 higher evolution score. A similar, although smaller and less significant effect is seen amongst
24 Independent Evangelicals ($n = 540$), for whom attendance at a Catholic school ($n = 27$) is
25 predictive of a higher evolution score. It is of note that faith schooling is predictive of a
26 higher evolution acceptance score only amongst religious groups with low mean scores for
27 evolution acceptance. It is not the case that mean EvoScores for Muslims or Independent
28 Evangelicals who attended Islamic or Catholic schools, respectively, are strongly positive;
29 rather it is that their EvoScores are less negative than the equivalent scores of those who
30 attended a secular school. Thus faith school attendance among these groups predicts less
31 strong rejection of evolution rather than active acceptance.
32
33
34
35
36
37
38
39
40
41
42

43 Within the whole sample, regular attendance at religious classes or activities (age 18
44 and under) is predictive of a small increase in EvoScore, and the same is seen in the Non-
45 Religious group. It is predictive of a lower score amongst Catholics, even though the official
46 Catholic position does not reject evolution, and Catholic affiliation is not predictive of a
47 lower evolution score. It is also predictive of a lower score amongst Muslims, although it is
48 important to note here that religious service attendance age 11 or 12 – as a proxy for religious
49 upbringing – is a less satisfactory control variable for Muslims than Christians. Intriguingly,
50 regular attendance at religious classes or activities is quite strongly predictive of a higher
51 EvoScore amongst Independent Evangelicals, even though the mean score for this group is
52 low.
53
54
55
56
57
58
59
60

1
2
3 Interestingly, age is not significantly predictive of attitude to evolution in these
4 models, except for Pentecostals, for whom increased age is significantly predictive of a lower
5 evolution score. Unfortunately it is not possible to tell from these data whether this is a life-
6 cycle effect or a cohort effect (a difference between generations).
7
8

9
10 In the United States, political conservatism (support for the Republican party) is
11 strongly predictive of evolution rejection. This study shows that in Britain no such link exists
12 in the population as a whole nor amongst any of the religious groups surveyed. In fact,
13 Anglicans have the largest proportion of Conservative voters but also one of the highest mean
14 EvoScores.
15
16
17
18
19
20

21 **Discussion**

22 Our study makes a number of contributions to this area of research. We provide strong
23 evidence that the number of “creationists”, particularly “young earth creationists” has been
24 greatly overstated in previous polls carried out in Britain. We find that only 2% of the British
25 population adhere to the Gallup-poll-question type of creationism, that is, a position requiring
26 both rejection of human evolution and acceptance of a young earth. We find that many
27 people hold unconfident or inconsistent views regarding evolution, with similar levels of
28 uncertainty about the age of the earth found across religious and non-religious groups. The
29 problematic construction of poll questions about evolution combined with a lack of
30 knowledge amongst publics likely explains why results from some polls show a relatively
31 high number of young earth creationists in Britain. These commonly-used answer categories
32 have probably also masked the fact that those who do select an ‘evolution’ category may
33 know or understand little about the theory, particularly regarding the age of the earth.
34
35
36
37
38
39
40
41
42

43 Although it is not possible to say definitively whether rejection of evolution is
44 increasing, this study does offer some indicative data. The largest and fastest-growing group
45 examined in this study – the Non-Religious – also have the highest mean EvoScore,
46 suggesting that acceptance of evolution may actually be increasing, or at least remaining
47 steady. However, what we may well be witnessing is a decline in the proportion of
48 religiously-affiliated people who accept evolution, given that the lowest EvoScores are found
49 amongst the religious groups showing growth, and the highest EvoScores amongst those
50 religious groups in decline.
51
52
53
54
55

56 Based on results from this study, we suggest that rather than witnessing an actual
57 increase in the proportion of people with creationist beliefs in Britain, we have instead seen
58
59
60

1
2
3 an increased *visibilisation* of creationism, and that this has been driven in part by concerns
4 about immigration, particularly Muslim immigration. As Salman Hameed observes, it is
5 “only a rejection of evolution by Muslims [that] makes for a news item as that feeds into the
6 existing narrative of “problems” of Muslim integration into a secular West” (Hameed, 2015).
7
8 Despite fears about Islamic creationism, we find that the issue of evolution does not seem
9 particularly salient for Muslims in Britain, with more Muslims than any other group selecting
10 the ‘neither agree nor disagree’ option for the eight Likert-scale items about evolution. A
11 recent ethnographic study of Sunni and Evangelical high schools in the U.S. similarly
12 concluded that the subject of evolution is not “morally salient” for Muslims in the way it is
13 for Evangelical Christians (Guhin, 2016). However, we do consider it possible that the recent
14 visibilisation of Islamic creationism may have increased the salience of the issue for British
15 Muslims, and that this could lead to an increased identification with creationist beliefs in the
16 future, a suggestion in line with the concerns about “creating ‘Islamic Creationists’” voiced
17 by Elsdon-Baker (2015).
18
19
20
21
22
23
24
25

26 We found that religious affiliation and attendance – or salah prayer frequency for
27 Muslims – together with education were key predictors of the acceptance or rejection of
28 evolution, supporting other research (Village and Baker, 2013; Miller et al., 2006; Haider-
29 Markel and Joslyn, 2008; Baker, 2013). We also found that among those faith-groups with
30 low average evolution scores, scores were higher if individuals had attended a faith school.
31 This suggests that for people from particular faith backgrounds, teaching evolution in a faith-
32 based context may lead to greater acceptance or less strong rejection of evolutionary theory
33 than when taught in a secular context.
34
35
36
37
38

39 How might this finding be explained? One possibility is that some individuals who
40 have attended private faith schools simply may not have encountered evolutionary theory. It
41 is plausible that such individuals would score higher on the EvoScale compared to those from
42 a similar background who have learnt about evolution and have consciously decided to reject
43 it. Another possibility is that teachers in faith schools may feel more confident or better
44 equipped to help students navigate the relationship between evolutionary theory and religious
45 beliefs. A further possibility is that students who perceive they are a religious minority within
46 their educational context may be more likely to develop a strengthened and possibly
47 oppositional (Ogbu, 1995) or adversarial (Portes and Zhou, 1993) religio-cultural identity. If,
48 additionally, students have only encountered the idea of belief in God and evolution as binary
49 opposites, then rejection of evolution may become a marker of religious identity that cannot
50 easily be discussed or challenged in the classroom.
51
52
53
54
55
56
57
58
59
60

1
2
3 Why, amongst Muslims in Britain, does the combination of high education and high
4 religiosity correspond with the lowest levels of evolution acceptance? One could argue that
5 highly educated and highly religious Muslims are simply more aware of an epistemological
6 clash between their religious beliefs and evolutionary biology. However, we would be
7 sceptical of such a generalisation given that Muslim elites historically have differed
8 considerably in their views of evolution. Furthermore, a small study of highly educated
9 Muslims in a different context – Pakistani doctors in the US – found no correlation between
10 religiosity and evolution acceptance (Everhart and Hameed, 2013), so it would be of great
11 interest to explore the relationship between religiosity and education amongst Muslims in
12 other contexts. Given our finding that Muslims who have attended secular secondary schools
13 are less accepting of evolution, we suggest it could be significant that most of the Muslim
14 graduates in our sample will have spent several years in the secular educational setting of a
15 British university. Any future studies of Muslim students' views of evolution should be sure
16 to pay close attention to students' broader experiences at university, including feelings of
17 alienation or inclusion, participation in student societies, and engagement with various
18 information sources.
19

20
21 Another result from this study that requires explanation is that Supplementary
22 Religious Education (evening or weekend religious classes or activities age 18 or under) is a
23 strongly positive predictor of evolution acceptance for Independent Evangelicals, even
24 though acceptance of evolution is low on average in this group. We speculate this could be
25 because many evangelical churches employ a dedicated youthworker/minister who is likely
26 to uphold traditional youth work values of informal education, voluntary participation and
27 young people's choice (Stanton, 2013; Shepherd, 2010). This emphasis on choice means that
28 Independent Evangelicals who have attended youth activities at evangelical churches may be
29 more likely to have encountered and discussed a range of possible theological positions
30 regarding creation and evolution, rather than being taught that one particular view is correct.
31

32
33 Whilst not wishing to use the findings from our study to advance a more general
34 argument in favour of faith schools, they do raise interesting questions about the experiences
35 of religious young people learning about evolution in non-religious schools, suggesting it is a
36 subject worthy of further investigation. These findings are particularly important given recent
37 and current debates in the UK regarding education policies, faith schools and the teaching of
38 evolution. This study adds to the growing body of evidence demonstrating that a deficit
39 model approach of simply supplying more information or education about evolution may not
40 produce the results desired by anti-creationist lobbying groups.
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

- 1
2
3
4
5 Allgaier J. (2014) United Kingdom. In: Blancke S, Hjerimitslev HH and Jjaergaard PC
6 (eds) *Creationism in Europe*. Baltimore: John Hopkins University Press, 50-64.
- 7 Bader CD and Finke R. (2014) Toward Assessing and Improving Survey Questions on
8 Religion: The ARDA's Measurement Wizard. *Journal for the Scientific Study of*
9 *Religion* 53: 652-661.
- 10 Baker JO. (2012) Public perceptions of incompatibility between "science and religion".
11 *Public Understanding of Science* 21: 340-353.
- 12 Baker JO. (2013) Acceptance of Evolution and Support for Teaching Creationism in
13 Public Schools: The Conditional Impact of Educational Attainment. *Journal for the*
14 *Scientific Study of Religion* 52: 216-228.
- 15 BBCNews. (2006) *Britons unconvinced on evolution*. Available at:
16 <http://news.bbc.co.uk/2/hi/science/nature/4648598.stm>.
- 17 BBCNews. (2011) *Muslim faith schools teach 'alien rubbish' says Dawkins*. Available at:
18 <http://www.bbc.com/news/education-15226421>.
- 19
20 Berger PL, Davie G and Fokas E. (2008) *Religious America, Secular Europe? : A Theme*
21 *and Variations* Aldershot, England ; Burlington, VT: Ashgate.
- 22
23 Blancke S, Hans Henrik Hjerimitslev, Johan Braeckman, and Peter C Kjærgaard. (2013)
24 *Creationism in Europe: Facts, Gaps and Prospects*. *Journal of the American*
25 *Academy of Religion* 81 996–1028.
- 26 Bland A. (2008) The Big Question: Why is creationism on the rise, and does it have a
27 place in education? . *The Independent*.
- 28 Brierley P. (2014) *UK Church Statistics 2: 2010-2020*. Tonbridge: ADBC Publishers.
- 29 Brown CG. (2009) *The death of Christian Britain: Understanding Secularisation, 1800-*
30 *2000* London: Routledge.
- 31
32 Campbell D. (2006) Academics fight rise of creationism at universities. *The Guardian*.
- 33 Curry A. (2009) Creationist Beliefs Persist in Europe. *Science* 323: 1159-1159.
- 34 Dawkins, R. (2010) *The greatest show on earth : the evidence for evolution*. London:
35 Black Swan.
- 36 El-Menouar Y. (2014) The Five Dimensions of Muslim Religiosity. Results of an
37 Empirical Study. *methods, data, analyses* 8: 53-78.
- 38 Elsdon-Baker F. (2015) Creating creationists: The influence of 'issues framing' on our
39 understanding of public perceptions of clash narratives between evolutionary
40 science and belief. *Public Understanding of Science* 24: 422-439.
- 41 Eurobarometer. (2005) *Europeans, Science and Technology*.
- 42 Evans JH and Evans MS. (2008) Religion and Science: Beyond the Epistemological
43 Conflict Narrative. *Annual Review of Sociology* 34: 87-105.
- 44 Everhart D and Hameed S. (2013) Muslims and evolution: a study of Pakistani
45 physicians in the United States. *Evolution: Education and Outreach* 6: 2.
- 46 Gardham D. (2008) Richard Dawkins: Muslim parents 'import creationism' into schools.
47 *The Telegraph*.
- 48 Graebisch A and Schiermeier Q. (2006) Anti-evolutionists raise their profile in Europe.
49 *Nature* 444: 406-407.
- 50 Guhin J. (2016) Why Worry about Evolution? Boundaries, Practices, and Moral Salience
51 in Sunni and Evangelical High Schools. *Sociological Theory* 34: 151-174.
- 52 Haider-Markel DP and Joslyn MR. (2008) Pulpits Versus Ivory Towers: Socializing
53 Agents and Evolution Attitudes. *Social Science Quarterly* 89: 665-683.
- 54 Hameed S. (2008) Bracing for Islamic creationism. *Science* 322: 1637-1638.
- 55
56
57
58
59
60

- 1
2
3 Hameed S. (2015) Making sense of Islamic creationism in Europe. *Public Understanding*
4 *of Science* 24: 388-399.
- 5 Hill JP. (2014) National Study of Religion and Human Origins. Biologos.
- 6 IpsosMORI. (2006) *BBC Survey On The Origins Of Life*. Available at: [https://www.ipsos-](https://www.ipsos-mori.com/researchpublications/researcharchive/262/BBC-Survey-On-The-Origins-Of-Life.aspx)
7 [mori.com/researchpublications/researcharchive/262/BBC-Survey-On-The-](https://www.ipsos-mori.com/researchpublications/researcharchive/262/BBC-Survey-On-The-Origins-Of-Life.aspx)
8 [Origins-Of-Life.aspx](https://www.ipsos-mori.com/researchpublications/researcharchive/262/BBC-Survey-On-The-Origins-Of-Life.aspx).
- 9 Kennedy C, Mercer A, Keeter S, et al. (2016) Evaluating Online Nonprobability Surveys.
10 Pew Research Center.
- 11 Koenig R. (2001) Creationism Takes Root Where Europe, Asia Meet. *Science* 292: 1286-
12 1287.
- 13 Lawes C. (2009) Faith and Darwin: Harmony, Conflict or Confusion. Theos, ComRes.
- 14 Long R and Bolton P. (2015) Faith Schools: FAQ. House of Commons Library.
- 15 Miller JD, Scott EC and Okamoto S. (2006) Public Acceptance of Evolution. *Science* 313:
16 765-766.
- 17 Newport F. (2014) *In U.S., 42% Believe Creationist View of Human Origins*. Available at:
18 [http://www.gallup.com/poll/170822/believe-creationist-view-human-](http://www.gallup.com/poll/170822/believe-creationist-view-human-origins.aspx)
19 [origins.aspx](http://www.gallup.com/poll/170822/believe-creationist-view-human-origins.aspx).
- 20 Numbers RL. (2006) *The Creationists: From Scientific Creationism to Intelligent Design*:
21 Harvard University Press.
- 22 Ogbu JU. (1995) Cultural problems in minority education: Their interpretations and
23 consequences—Part two: Case studies. *The Urban Review* 27: 271-297.
- 24 ONS. (2012) Religion in England and Wales 2011.
- 25 Paton G. (2014) *Alice Roberts: children 'indoctrinated' by lessons in creationism* Available
26 at: [http://www.telegraph.co.uk/education/educationnews/10579498/Alice-](http://www.telegraph.co.uk/education/educationnews/10579498/Alice-Roberts-children-indoctrinated-by-lessons-in-creationism.html)
27 [Roberts-children-indoctrinated-by-lessons-in-creationism.html](http://www.telegraph.co.uk/education/educationnews/10579498/Alice-Roberts-children-indoctrinated-by-lessons-in-creationism.html).
- 28 Pobiner B. (2016) Accepting, understanding, teaching, and learning (human) evolution:
29 Obstacles and opportunities. *American Journal of Physical Anthropology* 159:
30 232-274.
- 31 Portes A and Zhou M. (1993) The New Second Generation: Segmented Assimilation and
32 its Variants. *The ANNALS of the American Academy of Political and Social Science*
33 530: 74-96.
- 34 Rivers D. (2006) *Sample Matching: Representative Sampling from Internet Panels*.
35 Available at: <http://psfaculty.ucdavis.edu/bsjones/rivers.pdf>.
- 36 Rivers D. (2016) *Pew Research: YouGov consistently outperforms competitors on*
37 *accuracy*. Available at: [https://today.yougov.com/news/2016/05/13/pew-](https://today.yougov.com/news/2016/05/13/pew-research-yougov/)
38 [research-yougov/](https://today.yougov.com/news/2016/05/13/pew-research-yougov/).
- 39 Shepherd N. (2010) Religious socialisation and a reflexive habitus: Christian youth
40 groups as sites for identity work. *Religion and youth*: 149-155.
- 41 Stanton N. (2013) Faith-based Youthwork - Lessons from the Christian Sector. In:
42 Curran S, Harrison R and Mackinnon D (eds) *Working with Young People*. SAGE
43 Publications.
- 44 Twyman J. (2008) Getting It Right: YouGov and Online Survey Research in Britain.
45 *Journal of Elections, Public Opinion and Parties* 18: 343-354.
- 46 Village A and Baker S. (2013) Rejection of Darwinian Evolution Among Churchgoers in
47 England: The Effects of Psychological Type. *Journal for the Scientific Study of*
48 *Religion* 52: 557-572.
- 49 Voas D and Crockett A. (2005) Religion in Britain: Neither Believing nor Belonging.
50 *Sociology* 39: 11-28.
- 51
52
53
54
55
56
57
58
59
60

1
2
3 Williams J. (2008) Creationist Teaching in School Science: A UK Perspective. *Evolution:
4 Education and Outreach* 1: 87-95.

5 YouGov. (2013) *YouGov Survey Results*. Available at:

6 [http://cdn.yougov.com/cumulus_uploads/document/3s35pyaa5c/YG-Archive-
7 131125-Prospects.pdf](http://cdn.yougov.com/cumulus_uploads/document/3s35pyaa5c/YG-Archive-131125-Prospects.pdf).

10 Footnotes

11
12 ¹ The Muslim sample was weighted for age, gender and social grade to the 2011 Census data
13 for Muslims. Anglican and Catholic samples were weighted for age, gender and social grade
14 to data for Anglicans and Catholics respectively, averaged from five years' (2009 – 2013) of
15 the British Social Attitudes (BSA) survey. The Pentecostal sample was weighted for social
16 grade to the BSA 2009-2013 (whole population) and for age and gender to the English
17 Church Census 2005 for Pentecostals. The Independent Evangelical sample was weighted for
18 social grade to the BSA 2009-2013 (whole population) and for age and gender to the English
19 Church Census 2005 for "Independent" and "New Churches" categories averaged.

20
21
22 ² Factor analysis of the eight items for each religious group separately showed that items load
23 onto one component for Non-Religious and Independent Evangelicals, two components for
24 Anglicans and Pentecostals, and three components for Catholics and Muslims. Items 2, 3, 4
25 and 5 load onto the same component for all six of the groups and are the four highest loading
26 components except for Independent Evangelicals, for whom Item 7 loads higher than Item 4.
27 We therefore conclude that there is one dimension common to all groups under study,
28 consisting of items 2, 3 and 5.

29
30
31 ³ The concept of deep geological time is also central to the scientific theory of evolution.
32 However, amongst general publics, large numbers of people appear to be unsure about
33 geological timescales (see Figure 1.6 and 1.7), explaining in part why the items about the age
34 of the earth fail to hang together with other items central to evolutionary theory.

35
36
37 ⁴ Alpha values for EvoScale broken down by religious group are: Non-Religious = .888,
38 Anglican = .849, Catholic = .864, Pentecostal = .849, Independent Evangelical = .881,
39 Muslim = .780.

40
41
42 ⁵ We also tried including including ethnicity as an independent variable. However, results
43 were mostly insignificant, or *n* for the ethnic group concerned was extremely small.

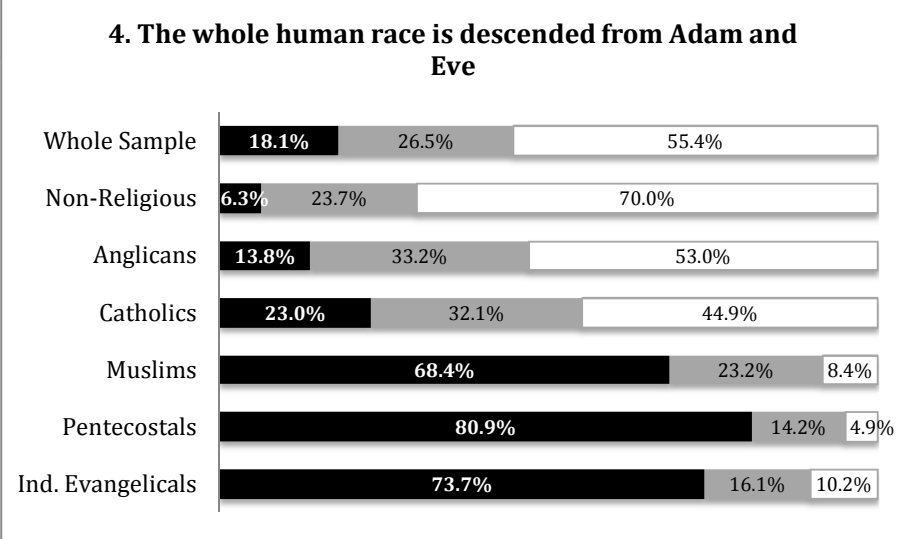
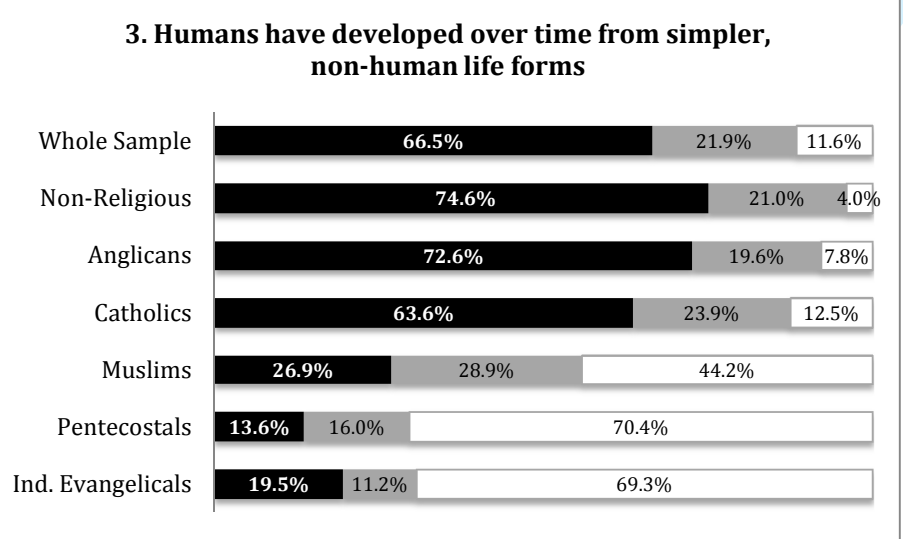
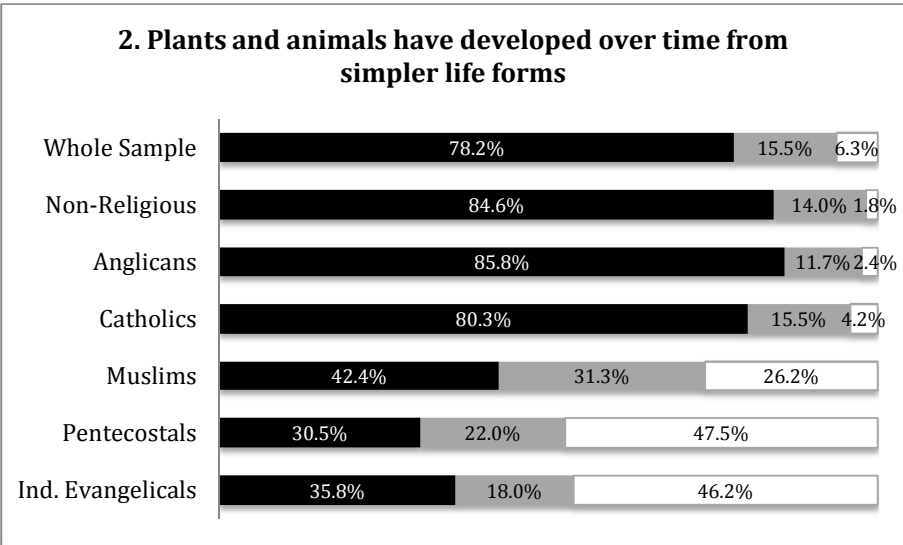
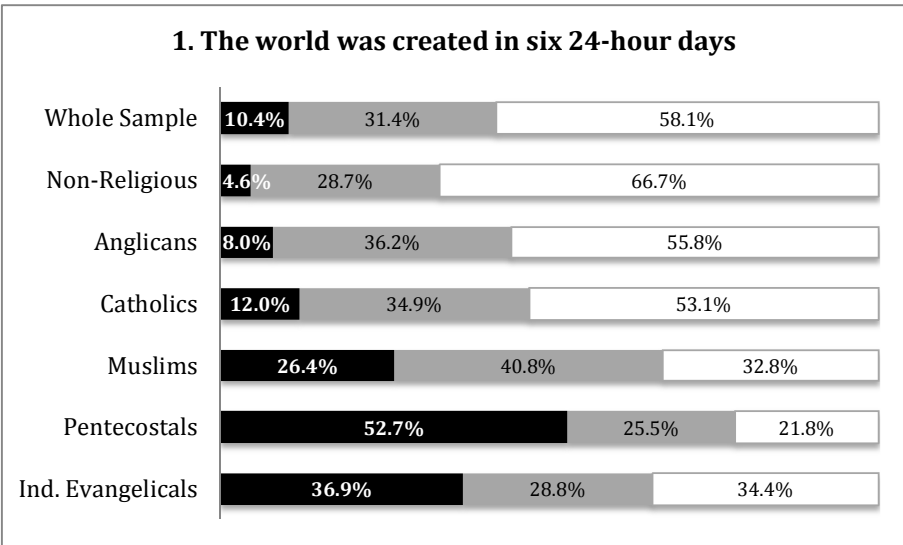
1
2
3 Pentecostals are the most ethnically mixed religious group in this study, but ethnicity was not
4 a significant predictor of EvoScore for this group.
5
6

7
8 ⁶ Although we present here results from regression analyses using the scale variable
9 EvoScale, we did also try regression analyses using responses to the single item about human
10 evolution (Item 3). Results from both analyses showed similar patterns.
11
12

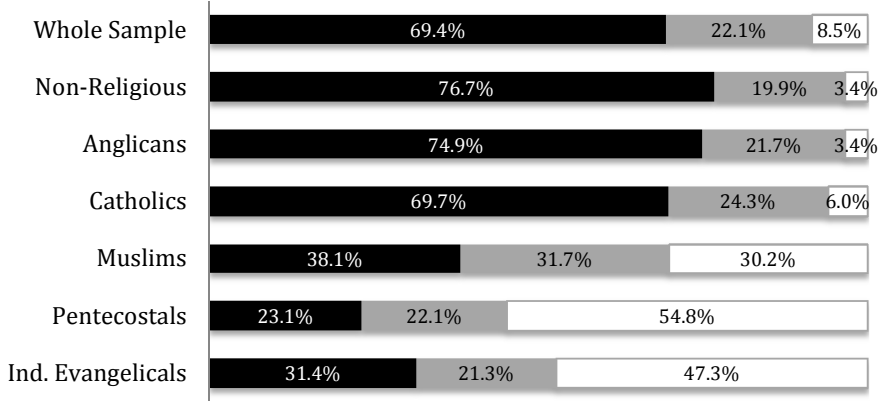
13
14 ⁷ We also confirmed that these interaction effects held true in a much simpler regression
15 model in which only age, gender, education and attendance were included as independent
16 variables.
17
18

19
20
21 ⁸ It was necessary to examine the Religiosity*Education interaction in the absence of the
22 Salah Prayer variable (included in the model as an additional measure of religiosity for
23 Muslims). The same pattern was seen when we examined Salah Prayer * Education (in the
24 absence of Religious Service Attendance).
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

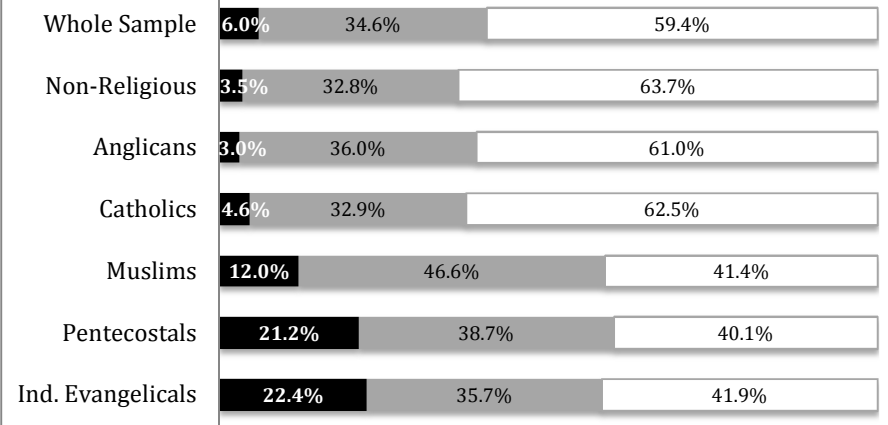
Figure 1) 1-8: Results from the eight Likert scale items about evolution. Black = Strongly agree or Agree; Grey = Neither agree nor disagree; White = Disagree or Strongly disagree.



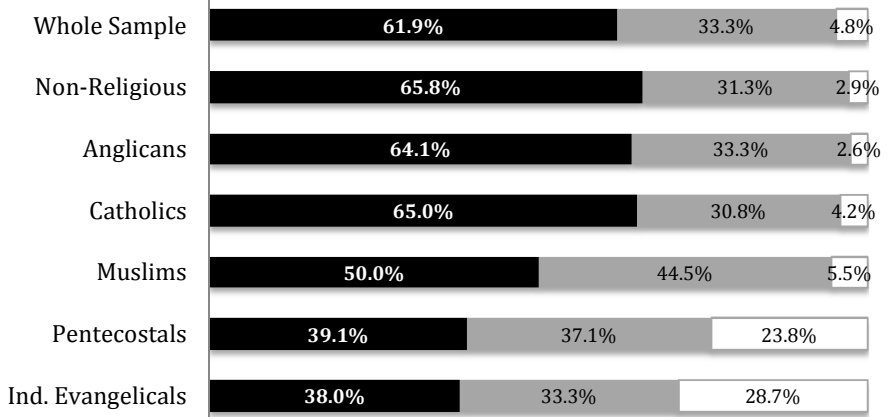
5. There is strong, reliable evidence to support the theory of evolution



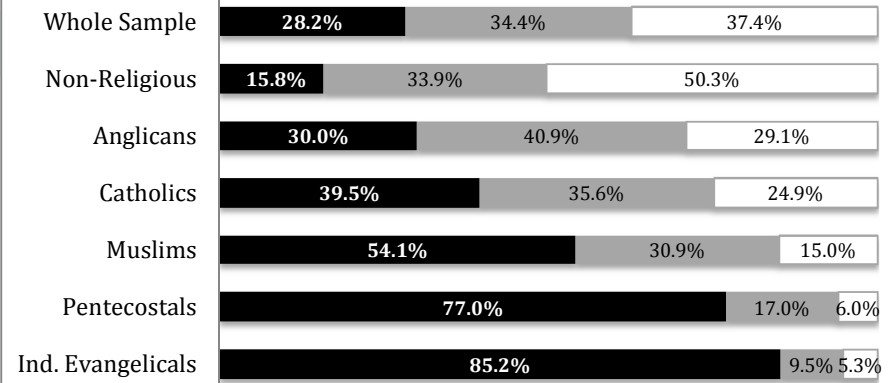
6. The earth is young - less than 10,000 years old



7. The earth is billions of years old



8. Life is too complex to have evolved solely by natural processes



1
2
3
4
5 **For each of the following statements, please say whether you strongly agree,**
6 **agree, neither agree nor disagree, disagree or strongly disagree:**
7

- 8 1. The world was created in six 24-hour days
9 2. *Plants and animals have developed over time from simpler life forms*
10 3. *Humans have developed over time from simpler, non-human life forms*
11 4. The whole human race is descended from Adam and Eve
12 5. *There is strong, reliable evidence to support the theory of evolution*
13 6. The earth is young - less than 10,000 years old
14 7. The earth is billions of years old
15 8. Life is too complex to have evolved solely by natural processes
16

17
18 Table 1 The eight Likert-scale items about evolution included in the survey instrument.
19 Items 2, 3 and 5 (in italics) were used to create 'EvoScale', the dependent variable used
20 in the multiple regression analysis.
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

	<i>N</i>	Min	Max	Mean	Std. Deviation
Whole sample	6020	-6	6	2.7964	2.85391
None	1633	-6	6	3.5592	2.38721
Anglican	1247	-6	6	3.0801	2.22808
Catholic	978	-6	6	2.6267	2.47546
Muslim	815	-6	6	-0.1495	3.12254
Pentecostal	322	-6	6	-1.8996	3.1813
Independent Evangelical	532	-6	6	-1.4543	3.52604

Table 2 Descriptive Statistics for EvoScale, for whole sample and for each religious group.

For Peer Review

	Whole Sample (<i>n</i> = 6020)	Religious Affiliation					
		Non-Religious (<i>n</i> = 1633)	Anglican (<i>n</i> = 1247)	Catholic (<i>n</i> = 978)	Muslim (<i>n</i> = 815)	Pentecostal (<i>n</i> = 322)	Independent Evangelical (<i>n</i> = 532)
Religious Factors							
<i>Religious Affiliation</i>							
Non-Religious (ref.)	--	--	--	--	--	--	--
Anglican	0.004	--	--	--	--	--	--
Catholic	-0.013	--	--	--	--	--	--
Muslim	-0.124**	--	--	--	--	--	--
Pentecostal	-0.108**	--	--	--	--	--	--
Independent Evangelical	-0.093**	--	--	--	--	--	--
Other Religion	-0.191**	--	--	--	--	--	--
Religious Service Attendance	-0.305**	-0.151	-0.404**	-0.423**	-0.305*	-0.699**	-0.238
Religious Service Attendance age 11 or 12	0.01	0.025	-0.024	0.026	0.048	0.027	-0.005
Frequency of Salah Prayer	-0.07**	--	--	--	-0.263**	--	--
<i>Attendance at regular religious classes</i>							
Never (ref.)	--	--	--	--	--	--	--
0-5 years	0.03**	0.068**	0.009	-0.048	-0.057	0.067	0.105**
6-10 years	0.016	0.022	0.049	-0.088**	-0.109**	-0.026	0.128**
11-18 years	0.022	0.032	0.019	-0.036	-0.085*	-0.038	-0.073
Educational Factors							

Education Level

School-Level Qualifications (ref.)	--	--	--	--	--	--	--
No formal qualifications	-0.068**	-0.061*	-0.08**	-0.07*	-0.044	0.172*	0.016
Undergraduate	0.094**	0.117**	0.1**	0.05	0.078	-0.134	0.149
Postgraduate	0.091**	0.119*	0.033	0.023	0.142*	-0.36	0.232
Attended school in the UK (age 11-16)	0.048**	0.032	-0.018	0.061	0.024	0.195**	0.061
<i>Religious Affiliation of school attended age 11-16</i>							
No religious affiliation (ref.)	--	--	--	--	--	--	--
Anglican	-0.014	0.002	-0.067*	-0.003	0.047	0.089	0.052
Catholic	0	-0.021	-0.003	-0.025	0.016	0.03	0.093*
Ind. Christian	-0.017	-0.036	-0.024	-0.009	0.054	0.011	-0.01
Islamic	0.065**	-0.015	--	--	0.169**	-0.002	--
Jewish	0.001	-0.031	--	--	--	-0.045	--
Hindu	0.024*	--	--	--	-0.01	--	--
Other	0.02	0.016	0.004	-0.009	-0.011	0.049	-0.007
Studied Biology at A-Level	0.040**	0.043	-0.007**	0.169**	0.055	-0.031	0.104*
Studied Biology at University	0.02	0.033	0.008	-0.026	0.002	0.075	0.037
Studied evolution at University	0.07**	0.083**	0.133**	0.113**	0.066	0.182**	-0.037

Interactions

Education Level *	0.031	0.014	0.299**	0.281*	-0.414**	0.596*	-0.176
Religious Service Attendance							
Demographic and Political Factors							
Voted Conservative 2010 election	-0.008	-0.001	0.011	-0.032	0.056	-0.042	-0.053
Age	-0.002	-0.001	0.045	0.073	0.018	-0.177**	-0.069
Male	0.092**	0.145**	0.077**	0.099**	0.041	-0.015	0.089*
Gross household income	-0.008	-0.030	0.023	0.028	-0.011	0.05	0.076*
Children in household (\geq 1)	-0.055**	-0.077**	-0.005	0.037	-0.11**	-0.016	-0.018
Never married	-0.01	-0.005	-0.049	-0.041	0.019	0.015	-0.03
R ²	.272	.111	.114	.148	.189	.259	.217

Table 3 Multiple regression showing standardized β values for each independent variable using EvoScale as the dependent variable. * $p < .05$, ** $p < .01$.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49

	Range	Whole Sample (n = 6020)	Religious Affiliation					
			Non-Religious (n = 1633)	Anglican (n = 1247)	Catholic (n = 978)	Muslim (n = 815)	Pentecostal (n = 322)	Independent Evangelical (n = 532)
Religious Factors								
<i>Religious Affiliation</i>								
Non-Religious	0-1	.513	1	0	0	0	0	0
Anglican	0-1	.199	0	1	0	0	0	0
Catholic	0-1	.085	0	0	1	0	0	0
Muslim	0-1	.039	0	0	0	1	0	0
Pentecostal	0-1	.007	0	0	0	0	1	0
Independent Evangelical	0-1	.006	0	0	0	0	0	1
Other Religion	0-1	.152	0	0	0	0	0	0
Religious Service Attendance	1-9	2.76 (2.27)	1.49 (.688)	3.11 (2.02)	4.20 (2.54)	5.19 (2.89)	6.85 (2.23)	7.10 (1.91)
Religious Service Attendance age 11 or 12	1-9	4.86 (2.84)	3.93 (.278)	5.56 (2.50)	6.87 (1.95)	5.72 (3.01)	6.57 (2.64)	6.40 (2.58)
Frequency of Salah Prayer	1-6	1.13 (.747)	1 (.000)	1 (.000)	1 (.000)	4.43 (1.70)	1 (.000)	1 (.000)
<i>Attendance at regular religious classes</i>								
Never	0-1	.688	.766	.510	.696	.614	.487	.600
0-5 years	0-1	.121	.105	.187	.094	.112	.229	.071
6-10 years	0-1	.133	.097	.215	.130	.221	.382	.167
11-18 years	0-1	.057	.032	.088	.080	.053	.359	.164

Educational Factors*Education Level*

No formal qualifications	0-1	.071	.081	.075	.060	.038	.056	.047
School-Level Qualifications	0-1	.426	.455	.414	.383	.401	.313	.313
Undergraduate	0-1	.278	.274	.263	.314	.306	.362	.363
Postgraduate	0-1	.183	.154	.223	.225	.162	.231	.253
Attended secondary school in the UK	0-1	.935	.959	.973	.894	.720	.739	.938

Religious Affiliation of school attended age 11-16

No religious affiliation	0-1	.469	.497	.417	.175	.560	.570	.660
Anglican	0-1	.321	.332	.540	.099	.108	.195	.233
Catholic	0-1	.133	.115	.014	.706	.035	.089	.054
Ind. Christian	0-1	.029	.024	.020	.010	.031	.088	.038
Islamic	0-1	.020	.009	.000	.000	.210	.016	.000
Jewish	0-1	.005	.003	.000	.000	.000	.002	.000
Hindu	0-1	.001	.000	.000	.000	.004	.000	.000
Other	0-1	.021	.020	.007	.010	.006	.037	.015
Studied Biology at A-Level	0-1	.088	.078	.073	.117	.143	.175	.153
Studied Biology at University	0-1	.019	.019	.013	.025	.032	.021	.025
Studied evolution at University	0-1	.079	.074	.050	.097	.090	.094	.092

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49

Demographic and Political Factors								
Voted Conservative 2010 election	0-1	.294	.263	.486	.266	.122	.241	.365
Age	18-94	48.14 (16.76)	46.24 (16.42)	56.54 (15.10)	47.84 (16.61)	35.98 (13.93)	44.19 (16.76)	47.05 (17.21)
Male	0-1	.468	.513	.488	.491	.501	.500	.481
Gross household income	1-17	9.38 (5.41)	9.21 (5.31)	9.48 (5.32)	9.62 (5.30)	9.48 (6.05)	9.03 (5.26)	9.12 (4.95)
Children in household (≥ 1)	0-1	.295	.277	.215	.289	.605	.431	.330
Never married	0-1	.179	.195	.114	.224	.220	.144	.171

Table S1 Descriptive statistics for all independent variables included in regression models. Standard deviation is shown in brackets for variables treated as continuous variables.