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‘Science disproves the biblical account of creation’:

Exploring the predictors of perceived conflict between science and religion
among 13- to 15-year-old students in the UK

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Abstract

This study drew on data provided by 11,809 13- to 15-year-old students drawn from the four nations of the United Kingdom to explore the level of agreement with the view that science disproves the biblical account of creation, and to explore the power of five sets of variables to predict individual differences in responses to that opinion. The five sets of variables were personal factors, psychological factors, religious factors, attitudinal factors (including ‘scientific fundamentalism’, understood as an exaggerated, uncritical, and unqualified belief in the inerrancy of science), and theological factors (distinguishing between differing implied theologies of religion). Blockwise multiple regression demonstrated that personal, psychological, religious, and theological factors all held significant power, but that the greatest variance was explained by the attitudinal variables. When the five sets of variables were assessed within the model, 25% of the variance was accounted for. Greater incompatibility between science and religion was associated with scientific fundamentalism ($\beta = .37, p < .001$), with anti-religious attitude ($\beta = .16, p < .001$), and with atheism ($\beta = .07, p < .001$). These findings suggest that young people who believe in science in an unqualified way are more distrustful of religion.

Keywords: science, religion, creation, creationism, quantitative survey, psychology of religion, empirical theology, scientific fundamentalism.

Introduction

There are a number of ways in which the connection between science and religion may be construed within adolescent minds. For example, Hansson and Redfors (2006, 2007) drew on a qualitative study conducted among 88 students in the last year of upper secondary school (normally 18 to 19 years of age) in Sweden. Hansson and Redfors (2007) concluded from research conducted among upper secondary students in Sweden that there is 'a great variation of views among students' concerning how the 'contribution from science to our worldview is related to other ways of knowing - in this case religion' (p. 468). In this study, 'about 60%' of the students (p. 468) expressed a view that science and religion do not exclude each other, but that it is possible to have a scientific view of the universe and at the same time to have a religious conviction. Hansson and Redfors (2006) illustrate the compatibility between a scientific and a religious view by citing the examples of Knut and Ragnar. Knut explains his position, rooted in the Christian tradition:

Big bang or something like it I believe has happened. But thanks to my Christian belief I think that the power that started it all was God. (p. 368)

Ragnar explains his position, rooted in the Islamic tradition:

I believe that God is the creator of all of it, which I want to show with the Koran, in which among other things, is written about how the earth came to be. That is Big Bang can also have happened. (p. 368)

Illustrative of the views of the other 40%, Hansson and Redfors (2007) cite the example of Ludvig:

They [science and religion] exclude each other by describing reality in completely different ways, – contradict each other. (p. 468)

Frequently encountered formulations of the conflict between science and religion are that, in a general sense, 'science disproves religion', or that, in a more specific sense, 'science

disproves the biblical account of creation'. Both of these formulations were explored by Taber, Billingsley, Riga, and Newdick (2011a) in their survey conducted among 109 11- to 14-year-old students in England (31 from a small city centre in East Anglia, 27 from a suburb of a large city in the South East, 24 from a coastal town in the North East, and 27 from a small rural town in the North). According to this survey, 26% of the participants agreed with the sentiment 'Science and religion disagree on so many things that you cannot believe both'; 28% of the participants agreed that 'Religious ideas about how the universe began have been proved wrong by science'; and 22% of the participants agreed that 'A good scientist cannot believe that life was created by God or a higher being'. These quantitative findings were supported by a second study reporting interviews with 12 13- to 14-year-old students (see Taber, Billingsley, Riga, & Newdick 2011b).

The purpose of the present paper is to design a new empirical enquiry regarding the prevalence of the view (that science disproves the biblical account of creation) and to explore the comparative power of five social scientific theories that may explain individual differences in endorsement of this view. Situating the question concerning the perceived conflict between science and religion within this particular conceptual and statistical framework promises original insights within a developing scientific literature.

Exploring social scientific theories

Recent empirical literatures exploring individual differences in the ways in which adolescents conceive the relationship between science and religion have drawn on five main conceptual frameworks rooted in what may be conveniently distinguished as personal factors, psychological factors, religious factors, attitudinal factors, and theological factors. Each of these five areas will be reviewed in turn before introducing new empirical analyses designed to adjudicate among the explanatory power of these different theories.

The first group of theories focus on *personal factors*, including sex and age. In terms of sex, considerable attention, both empirical and theoretical, has been given to the general finding within Christian and post-Christian societies that females are more religious than males. The relevant literature was reviewed by Francis (1997) and brought up to date by Francis and Penny (2014). A different strand of literature has routinely reported more positive attitudes toward science among males than among females (see Rosenkranz & Charlton 2013). Taken together, these two strands of research identify sex differences as a relevant personal factor in predicting perceived conflict between science and religion, with greater conflict being assumed by male students than by female students.

In terms of age, research conducted among students between the ages of 8 and 16 years has consistently documented a deterioration in attitude toward religion over this age period. The relevant literature was reviewed by Kay and Francis (1996) who also added a new set of data confirming the same phenomenon. A different strand of research has found that attitude toward science does not decline over this age range in such a marked way (see Francis & Greer 1999). Taken together, these two strands of research identify age trends as a relevant personal factor in predicting perceived conflict between science and religion with greater conflict being assumed among older students rather than among younger students.

The second group of theories focus on *psychological factors*, with particular reference to personality constructs. There has been a long-established interest within the empirical psychology of religion linking individual differences in religiosity with personality constructs. Interesting confirmation of the changing consensus on this issue comes from comparison between Argyle's initial review of the literature in the late 1950s, when he concluded that there was insufficient empirical evidence to draw firm conclusion on this matter (Argyle 1958), and his third review four decades later when he concluded that the evidence pointed to a firm negative link between levels of religiosity and the dimension of

personality known as psychoticism (Beit-Hallahmi & Argyle 1997). Argyle's conclusion was based on the growing body of research within the psychology of religion drawing on the three dimensional model of personality proposed by Eysenck and Eysenck (1975).

Eysenck's dimensional model of personality maintains that individual differences in personality can be most adequately and economically summarised in terms of three higher order orthogonal (that is uncorrelated) dimensions (extraversion, neuroticism, and psychoticism). This model also takes the view that neurotic and psychotic disorders are not discontinuous from normal personality but occupy the extreme ends of two different continua which describe individual differences in normal personality. Eysenck's three-dimensional model of personality has been operationalised in a series of instruments designed for use among both adults and young people, including the Eysenck Personality Questionnaire (Eysenck & Eysenck 1975), the Eysenck Personality Questionnaire Revised (Eysenck, Eysenck, & Barrett 1985), and the Eysenck Personality Scales (Eysenck & Eysenck 1991). This strand of research identifies personality differences as a relevant psychological factor in predicting perceived conflict between science and religion, with greater conflict being associated with higher psychoticism scores.

The third group of theories focus on *religious factors*, and has been shaped largely by traditions and conceptualisations framed within the social scientific study of religion. These traditions and conceptualisations focus largely on the phenomenological aspects of religion while at the same time recognising the multidimensional nature of the social face and presence of religion. Within this tradition, connections are observed between religious practices and beliefs about religion. At the same time, the multidimensional nature of religious practice has tended to distinguish between the public nature of worship attendance and the private nature of personal prayer. The public nature of worship attendance maps more readily onto Allport and Ross' (1967) conceptualisation of extrinsic religious orientation,

while the private nature of personal prayer maps more readily onto their conceptualisation of intrinsic religious orientation.

The predictive power of church attendance in explaining individual differences in the areas of personal and social values of young people has been well documented by Francis (2001) in *The Values Debate* and more widely by Gill (1999) in *Churchgoing and Christian ethics*. There has also been a long-established interest within the psychology of religion concerned with exploring the correlates of personal prayer, as reviewed in such studies as Brown (1994), Francis and Astley (2001), and Spilka and Ladd (2013). The predictive power of personal prayer in areas of personal and social values among young people has been documented by studies like Francis and Robbins (2009) and Francis and Fisher (2014). This strand of research identifies both worship attendance and personal prayer as relevant religious factors (understood from the perspective of the social scientific study of religion) in predicting perceived conflict between science and the biblical account of creation.

The fourth group of theories focuses on *theological factors*, as distinct from religious factors. While empirical research concerned with religious factors draws on the longer-established traditions of the social scientific study of religion, empirical research concerned with theological factors has its roots in the more recently developed field of empirical theology, as reflected in the work of van der Ven in the Netherlands (see van der Ven & Scherer-Rath 2004), Ziebertz in Germany and Francis in the UK (see Francis & Zeibertz 2011). Empirical theology would argue that the concern of the social scientific study of religion with accessing religious phenomena (like worship attendance and personal prayer) needs to be augmented by concern with accessing the theological beliefs of religious individuals and religious communities.

Working within the tradition of empirical theology, Astley and Francis (2016) argued that a core construct within theology relevant to predicting a range of individual personal and

social differences was the theology of religions. The theology of religions is concerned with the interpretation and evaluation of the divergent truth-claimed views of salvation that are asserted or implied by different religious traditions or by different strands within the same broad religious traditions. They proposed the Astley-Francis Theology of Religions Index, a multi-choice instrument that distinguishes between six current positions within the theology of religions, characterised as Atheism, Agnosticism, Exclusivism, Inclusivism, Pluralism, and an Interreligious perspective, with a further subdivision between two expressions of the pluralism perspective. Exclusivism is understood here as the view that only one religion is really true, all others being totally false; inclusivism that only one religion is really true, but at least one other is partly true; pluralism A is the view that all religions are equally true, whereas pluralism B claims that all religions express the same truth in different ways; and an interreligious perspective claims that real truth comes from listening to all religions.

This new instrument has now been employed alongside measures proposed within the social scientific study of religion to test the extent to which theological factors add additional predictive power to models after religious factors have been taken into account. The dependent variables so far employed in testing this research question include attitudes toward religious diversity (Francis, Penny, & Astley, in press) and attitude toward freedom of religion and freedom of religious clothing and symbols in school (Francis, Village, McKenna, & Penny 2018). In each of these studies, additional variance has been explored by adding the Astley-Francis Theology of Religions Index to the model. Although this tradition has not yet been applied to the field of exploring individual differences in the perceived conflict between science and religion, it is reasonable to anticipate that it would be helpful to do so.

The fifth and major group of theories is in some ways the most important and has been described as *attitudinal factors*. Among these attitudinal factors the centre piece is provided by the notion of an exaggerated, uncritical, and unqualified (and therefore distorted)

appreciation of and trust in science, which reflects the views that absolute truth may be obtained by science and that science is the only source of real (or of valuable) knowledge. Such beliefs in the cognitive supremacy and universal applicability of science are routinely labelled as 'scientism', a concept that has been defined and characterised in a variety of ways (Midgley 1985, 28; Peacocke 1993, 8; Sorell 1994, 1-3, 176-177; Noordhof 1995, 814; Dupré 2001, 1; Alexander 2001, 273, 285; Peterson 2003; Stenmark 2003; Maxwell 2003; Draper 2005, 280; Schloss 2006, 190; Peters 2006, 376; Kidd 2014). Critics of scientism regard it as no part of science, but instead understand it to be a philosophical, metaphysical, or ideological position (Nagel 1986, 9; Feyerabend 1987, 36; Padgett 2003, 71; Sorell 1994, chs 1, 2 and 6; Stenmark 2003; Peters 2006, 377; Hutchinson 2011, 1; Burnett, n.d.). It contrasts markedly with the fallibilism and revisability that most philosophers of science regard as being at the heart of the scientific method.

Aspects of this stance have been operationalised and employed in relation to the conversation (or conflict) between science and religion, in a sequence of four studies that have helped to illuminate the tension between science and religion in the minds of young people by employing such a 'fundamentalist' belief in science as a control variable (Fulljames & Francis 1988; Fulljames, Gibson, & Francis 1991; Francis & Greer 2001; and Astley & Francis 2010).

Francis and Greer (2001) drew on data provided by 1,584 students between the ages of 14 and 16 years in Northern Ireland. These students completed four measures of attitude toward Christianity, attitude toward science, unqualified belief in science, and belief in creationism, as well as behavioural measures of worship attendance and personal prayer. According to these data, there was a small but significant positive association between attitude toward religion and attitude toward science, after including belief in creationism and unqualified belief in science as control variables. In other words, those who were more

positively disposed to religion were also more positively disposed to science, but this underlying positive correlation was distorted and obscured in those cases where young people had adopted more extreme views either about science or about religion (creationism). This finding was confirmed by the subsequent study reported by Astley and Francis (2010) among 187 female A level religious studies students attending a sixth-form study day who also completed the same set of four scales. In this study, the negative bivariate correlation between attitude toward science and attitude toward religion ($r = -.21, p < .01$) was transformed into a positive partial correlation after controlling for belief in creationism and for an unqualified belief in science ($r = .24, p < .001$).

This strand of research identifies this totalising belief in science as an attitudinal variable relevant in predicting perceived conflict between science and religion. The research studies reported by Fulljames, Gibson, and Francis (1991), Francis and Greer (2001), and Astley and Francis (2010) that used a measure of this form of belief in science also employed two other attitudinal measures that demonstrated predictive power, in terms of assessing attitude toward religion and religious fundamentalism or creationism. The measure of attitude toward religion employed in the two earlier studies was the Francis Scale of Attitude toward Christianity (Francis 1989; Francis, Lewis, Philipchalk, Brown, & Lester 1995). The more recent study employed the Astley-Francis Scale of Attitude toward Theistic Faith (Astley, Francis, & Robbins 2012). The advantage of the later measure derives from its appropriate application within a wider context of religious diversity. A measure of creationism was proposed by Astley and Francis (2010), while a broader measure of fundamentalism (including creationism) was proposed by Gibson (1995).

Although not integrated into his research concerning the connection between science and religion, Greer developed the notion of assessing rejection of religion as a construct in its own right and not simply as the low-scoring pole of a measure of positive religious affect.

The Rejection of Christianity Scale proposed by Greer and Francis (1992) has been applied and tested in a sequence of studies including work reported by Lewis, Maltby, and Hersey (1999), Robbins, Francis, and Bradford (2003), and Williams, Francis, and Robbins (2006).

Within the attitudinal factors, alongside a measure of the unlimited and unqualified belief in science as inerrant that we here designate as ‘scientific fundamentalism’ (Maitland 1994, 15; Pigliucci 2002, 114: cf. Barr 1981, 40; Farias, Newheiser, Kahane, & de Toledo 2013; Public Broadcasting Service, n.d.), there is the opportunity to assess the predictive power of three other measures in explaining variance in responses to the view that science disproves the biblical account of creation: that is, attitude toward theistic faith, religious fundamentalism, and rejection of religion.

Research question

Against this background, the aim of the present analyses is to draw on the rich data generated by the Young People’s Attitudes to Religious Diversity Project conducted across the four nations of the UK (see Francis, Croft, Pyke, & Robbins 2012) in order to address three primary research questions. The first research question is to document the style and level of endorsement among 13- to 15-year-old students of the view that science disproves the biblical account of creation. The second research question is to examine individually the power of the five main conceptual frameworks proposed by recent social scientific empirical literatures to explain individual differences in the ways in which adolescents conceive the relation between science and religion. How powerful is each of these conceptual frameworks taken by itself to account for individual differences in the endorsement of the view that science disproves the biblical account of creation? The third research question is to employ a sequence of multiple regression models in order to adjudicate among the relative power of these conceptual frameworks (and components within these frameworks) when all the predictor variables are considered working simultaneously.

Method

Procedure

As part of a project on religious diversity designed to examine the experiences and attitudes of young people concerning religion within multi-cultural or multi-faith contexts throughout the four nations of the UK, classes of 13- to 14-year-old students and classes of 14- to 15-year-old students were invited to complete a detailed questionnaire survey administered during a routine lesson. The participants were guaranteed confidentiality and anonymity, and were given the choice not to submit their questionnaire at the end of the lesson to be included in the research project. Overall interest in the survey was such that the majority of students wished their anonymous views to be taken into account and so submitted their questionnaire. Half of the participating students were attending schools with a religious character within the state-maintained sector and half were attending schools without a religious character within the state-maintained sector.

Instrument

The *Religious Diversity and Young People* questionnaire was designed for self-completion, using mainly a multiple-choice response format and short statements rated on the following five-point Likert scale: agree strongly (5), agree (4), not certain (3), disagree (2), and disagree strongly (1). In the present analysis the following variables were used.

Age and sex were assessed by dichotomous items: male (1) and female (2); two year groups of 13 to 14 years (1), and 14 to 15 years (2).

Personality was assessed by the abbreviated form of the Junior Eysenck Personality Questionnaire Revised (JEPQR-A: Francis 1996). This instrument proposes three six-item measures of extraversion, neuroticism, and psychoticism. Each item is rated on a dichotomous scale: yes (1) and no (0).

Worship attendance was assessed by the question, ‘Apart from special occasions (like weddings), how often do you attend a religious worship service (e.g. in a church, mosque, or synagogue)?’, rated on a seven-point scale: never (1), at least once a year (2), sometimes (3), at least six times a year (4), at least once a month (5), nearly every week (6), and several times a week (7).

Personal prayer was assessed by the question, ‘How often do you pray in your home or by yourself?’, rated on a five-point scale: never (1), occasionally (2), at least once a month (3), at least once a week (4), and nearly every day (5).

Attitude toward theistic faith was assessed by the seven-item Astley-Francis Scale of Attitude toward Theistic Faith proposed by Astley, Francis, and Robbins (2012). An example item is: ‘God means a lot to me’. Each item is rated on the five-point Likert scale.

Scientific fundamentalism was assessed by a three-item scale developed from the seven-item measure proposed by Astley and Francis (2010). An example item is: ‘Science can give us absolute truth’. Each item is rated on the five-point Likert scale.

Rejection of religion was assessed by a new three-item scale. An example item is: ‘Religion is mainly a force for bad in the world today’. Each item is rated on the five-point Likert scale.

Religious fundamentalism was assessed by a new four-item scale. An example item is: ‘I believe that God made the world in six days of 24 hours’. Each item is rated on the five-point Likert scale.

Theology of religions was assessed by the Astley-Francis Theology of Religions Index (AFTRI: Astley & Francis 2016). The participants were invited to ‘tick the *one* statement that comes closest to’ their own belief. Within the environment of regression analysis, inclusiveness is taken as the base-line variable and each of the other six approaches is shaped as a dummy variable: present (1), absent (0).

Science disproves the biblical account of creation was assessed by this single item rated on the five-point Likert scale. Cognitive testing demonstrated that this item was interpreted by participants within the age group as characterising the conflict between science and religion.

Participants

Completed data were submitted by 11,809 participants: 5,519 male students, 6,216 female students, and 74 students who did not disclose their sex; 6,042 students aged 13 to 14 years, 5,720 students aged 14 to 15 years, and 47 students who did not disclose their age. In terms of worship attendance, 40% of the participants never attended, 28% attended less than six times a year, 5% attended at least six times a year, 6% attended at least once a month, and 21% attended nearly every week. In terms of personal prayer, 53% never prayed, 22% prayed occasionally, 3% prayed at least once a month, 7% prayed at least once a week, and 15% prayed nearly every day.

Analysis

The data were analysed using the SPSS statistical package, drawing on the frequency, correlation, reliability, and regression routines. The regression routine employed fixed order entry so that the five sets of variables (personal, psychological, religious, attitudinal, and theological) were structured *incrementally* in such a way that the personal variables were entered in step one, the psychological variables in step two, the religious variables in step three, the attitudinal variables in step four, and finally the theological variables in step five. This sequence allows the *additional* effects of the theological variables to be noted after the effects of all the other variables have been taken into account.

Results and discussion

The first step in data analysis examined the distribution of responses to the core dependent variable at the heart of the present study: Science disproves the biblical account of

creation. To this statement, 12% of the participants agreed strongly and 17% agreed, while 12% disagreed strongly and 11% disagreed, leaving the largest proportion (49%) registering the 'not certain' response. This pattern of responses approximates the normal distribution legitimating the proposed analytic model.

- insert table 1 about here -

The second step in data analysis examined the scale properties of the four attitudinal measures and the three psychological measures employed in the analytic model. Table 1 presents these data in respect of the scales of attitude toward theistic faith, rejection of religion, religious fundamentalism, scientific fundamentalism, extraversion, neuroticism, and psychoticism. Six of the seven measures recorded alpha coefficients (Cronbach 1951) in excess of the threshold of .65 proposed by DeVellis (2003). The lower reliability reported by the psychoticism scale is consistent with the findings of earlier studies and with the recognised problematic nature of operationalising this dimension of personality (see Francis, Brown, & Philipchalk 1992).

- insert table 2 about here -

Given the specific importance of the four attitudinal variables, table 2 examined these four scales in greater detail by presenting both the correlations between the individual items and the sum of the other items, and the item endorsement in terms of the sum of the agree and the agree strongly response. The levels of the correlations demonstrate that each item is covarying well in relation with the other items. The item endorsement demonstrate that in respect of the scale of theistic faith around one third of the participants endorse the positive items, 33% agreeing that God means a lot to them and 34% agreeing that God helps them. In respect of the scale of religious fundamentalism, 42% of the participants believe in hell and 19% believe that God made the world in six days of 24 hours. In terms of scientific fundamentalism, 42% of the participants think that theories in science can be proved to be

definitely true, and 25% think that the laws of science will never be changed. In terms of rejection of religion, 46% of the participants consider that religion brings more conflict than peace, and 21% consider that religion is mainly a force for bad in the world today.

The Astley-Francis Theology of Religions Index found the following distribution among the seven theologically defined positions: exclusivism (6%), inclusivism (6%), pluralism A (13%), pluralism B (26%), interreligious perspective (7%), atheism (10%), and agnosticism (31%).

- insert table 3 about here -

The third step in data analysis examined the correlations between the personal and psychological factors and the religious, attitudinal, and theological factors in order to explore these interrelationships among the range of predictor variables. Table 3 demonstrates the following associations. In view of the number of correlations being tested simultaneously, statistical significance was set at the one percent level. In terms of sex differences, female students recorded significantly higher scores on worship attendance, personal prayer, religious fundamentalism, theistic faith, and two positions within the theology of religions (pluralism and agnosticism); male students recorded significantly higher scores on rejection of religion, scientific fundamentalism, and three positions within the theology of religions (exclusivism, inclusivism and atheism). In terms of age differences, endorsement of rejection of religion, and of one position within the theology of religions (pluralism B) increased with age. Endorsement of religious fundamentalism, attitude toward theistic faith, and one position with the theology of religions (pluralism A) decreased with age. In terms of psychological factors, the psychoticism scale provided the highest predictor of individual differences in the religious and theological factors, as is consistent with the claims of Francis (1992) that psychoticism is the dimension of personality fundamental to individual differences in religiosity. Psychoticism scores were positively correlated with rejection of religion and three

positions within the theology of religions (exclusivism, atheism, and agnosticism); psychoticism scores were negatively correlated with worship attendance, personal prayer, religious fundamentalism, attitude toward theistic faith, and two positions within the theology of religions (pluralism and interreligious). These data support the strategy of entering personal and psychological factors early in the regression model before the religious, attitudinal, and theological factors.

- insert table 4 about here -

The fourth step in data analysis examined the bivariate correlations between the individual predictor variables (personal factors, psychological factors, religious factors, attitudinal factors, and theological factors) and the dependent variable (Science disproves the biblical account of creation). These data are presented in the first row of table 4. In light of the number of correlations being tested simultaneously and the size of the sample, correlations recorded at the five percent level of probability will not be interpreted as significant. In terms of personal factors, the correlations show that female students are significantly less likely than male students to endorse the view that science disproves the biblical account of creation. On the other hand, there was no significant difference between the levels of endorsement recorded by 13- to 14-year-old students and by 14- to 15-year-old students. In terms of psychological factors, the only dimension of personality to record a significant relationship was the extraversion scale, with introverts recording a significantly higher endorsement of the view that science disproves the biblical account of creation.

In terms of the two religious factors, there were significant negative correlations between the view that science disproves the biblical account of creation and both frequency of worship attendance and frequency of personal prayer. Students who are themselves practising religious faith are less likely to support this view.

The correlations with the attitudinal factors demonstrate the strongest predictors of individual differences in the view that science disproves the biblical account of creation. Both rejection of religion and scientific fundamentalism are positively correlated with the view that science disproves the biblical account of creation. Both religious fundamentalism and theistic faith are negatively correlated with the view that science disproves the biblical account of creation.

The correlations with the theological factors demonstrate that the students who identify with the atheist position are those most likely to espouse the view that science disproves the biblical account of creation. The students who identify with the exclusivist position or with the inclusivist position are those least likely to espouse the view that science disproves the biblical account of creation. Those who identify with the interreligious position are slightly more likely to espouse the view that science disproves the biblical account of creation, while those who identify with the pluralism B position are slightly less likely to do so.

The fifth step in data analysis moves beyond bivariate correlational analysis to construct a series of regression models in which the five groups of predictor variables are entered into the model in sequential stages as displayed in table 4. In the final model (model 5) the theological factor (concerned with the theology of religions) has been entered into the model as a sequence of six dummy variables with the theological position of inclusivism taken as the reference point. It is the final model (when all the predictor variables are within the equation) that is most revealing. The beta weights in model five demonstrate that the strongest predictor of the view that science disproves the biblical account of creation is scientific fundamentalism. When scientific fundamentalism is taken into account, the second strongest predictor is rejection of religion. When scientific fundamentalism and rejection of religion are both taken into account, the third strongest predictor is the theological position of

atheism. The regression model shows that these three predictor variables are cumulative in their effect: the students most likely to espouse the view that science disproves the biblical account of creation are those who score high on scientific fundamentalism, hold a negative rejectionist view of religion, and count themselves as atheists.

Conclusion

This study proposed examining the notion that ‘science disproves the biblical account of creation’ as a lens through which to explore a potentially core adolescent conceptualisation of the presumed conflict between science and religion. Specifically, three focused research questions were directed to data provided by 11,809 13- to 15-year-old students drawn from the four nations of the UK who participated in the quantitative strand of the Young People’s Attitudes to Religious Diversity Project (Francis, Croft, Pyke, & Robbins 2012).

The first research question was concerned to document the style and level of endorsement among 13- to 15-year-old students of the view that science disproves the biblical account of creation. In relation to this question, two main conclusions can be drawn from the data. The first conclusion is that half of the students (49%) did not wish to express an opinion on this issue. Either for them this is not a pressing issue and for that reason they have developed no clear opinion, or for them it is a complex issue on which they wish to keep an open mind. Further research is needed to clarify this matter. The second conclusion is that for the other half of the students (51%) this issue is an active question and they have adopted a position in relation to that issue: 29% agreed or agreed strongly that science disproves the biblical account of creation, and 23% disagreed or disagreed strongly with this view. It remains a matter of social scientific interest, therefore, to explore the factors that may have helped to shape the formulation of these diverse perspectives.

The second research question was concerned to examine individually the power of the five main conceptual frameworks proposed by recent empirical literatures to explain

individual differences in the ways in which adolescents conceive the relationship between science and religion. These five main conceptual frameworks were rooted in what may be conveniently distinguished as personal factors, psychological factors, religious factors, attitudinal factors, and theological factors. In relation to this question, it can be affirmed that all five groups of factors (examined separately) explained significant variance in endorsement of the notion that science disproves the biblical account of creation, but the explanatory power varied considerably among the five groups of factors. The personal and the psychological factors emerged as weaker than the religious, theological, and attitudinal factors.

The third research question was concerned to employ a sequence of multiple regression models in order to adjudicate among the relative power of the five conceptual frameworks (and components within those frameworks) when all the predictor variables are considered working simultaneously. In relation to this question, two main conclusions can be drawn from the data. The first conclusion is that scientific fundamentalism is the single most important factor of those considered here in explaining endorsement of the view that science disproves the biblical account of creation. From a pedagogical perspective, scientific fundamentalism may be considered as generating problems and difficulties not only for conceptualising the relation between science and religion, but also for conceptualising and appreciating the activity of science itself. The second conclusion is that the impact of scientific fundamentalism on conceptualising conflict between science and religion is intensified when combined with anti-religious attitudes (as conceived within the social scientific study of religion) and with atheism (as conceived within empirical theology). It is this second conclusion that carries particular weight within the broader context of the project within which the present analyses were conceived. This broader project is concerned with understanding young people's attitudes toward religious diversity and with living within

religiously diverse societies. Peaceful and constructive coexistence of religious groups alongside those who hold different religious or non-religious worldviews may rest on intelligent and unprejudiced evaluation of alternative theologically-informed belief systems. From a pedagogical perspective, anti-religious attitudes and atheism may justify as much critical attention within both religious education and citizenship education as uncritical religious worldviews.

The clear limitations with the present analysis are partly the inevitable consequence of this specific research problem being embedded within a project more broadly concerned with exploring issues of religious diversity. The present analyses would have been enriched by the availability of a more robust dependent variable (in place of the single item currently used) and by the availability of stronger and more fully nuanced predictor variables (including a better established measure of the extreme, unqualified, ‘fundamentalist’ form of belief in science). The results, however, are both sufficiently robust and sufficiently intriguing to serve as the foundation for future, more fully developed empirical investigations.

Note

Young People’s Attitudes to Religious Diversity Project (AHRC Reference: AH/G014035/1) was a large-scale mixed methods research project investigating the attitudes of 13- to 16-year-old students across the United Kingdom. Students from a variety of socio-economic, cultural, ethnic, and religious backgrounds from different parts of England, Wales, Northern Ireland and Scotland, with the addition of London as a special case, took part in the study. Professor Robert Jackson was principal investigator and Professor Leslie J. Francis was co-investigator. Together they led a team of qualitative and quantitative researchers based in the Warwick Religions and Education Research Unit, within the Centre for Education Studies at the University of Warwick. The project was part of the AHRC/ESRC Religion and Society Programme and ran from 2009-2012.

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Table 1

Scale properties

Scale	N items	alpha	Mean	SD	Low	High
Attitude toward theistic faith	7	.93	20.20	7.84	7	35
Rejection of religion	3	.71	9.04	2.80	3	15
Religious fundamentalism	4	.71	10.96	3.71	4	20
Scientific fundamentalism	3	.69	9.28	2.59	3	15
Extraversion	6	.68	4.69	1.53	0	6
Neuroticism	6	.68	3.10	1.80	0	6
Psychoticism	6	.58	1.15	1.30	0	6

Table 2

Scale items for the attitudinal variables

	r	Yes %
<i>Attitude toward theistic faith</i>		
I find it hard to believe in God*	.58	37
Prayer helps me a lot	.78	27
I think going to a place of worship is a waste of my time*	.54	27
I know that God is very close to me	.88	30
God helps me to lead a better life	.89	31
I know that God helps me	.90	34
God means a lot to me	.90	33
<i>Religious fundamentalism</i>		
I believe in hell	.51	42
I believe that God made the world in six days of 24 hours	.59	19
There is only one God	.55	36
The earth is only a few thousand years old	.35	6
<i>Scientific fundamentalism</i>		
Theories in science can be proved to be definitely true	.56	42
The laws of science will never be changed	.44	25
Science can give us absolute truths	.62	27
<i>Rejection of religion</i>		
Religion brings more conflict than peace	.56	46
Religious people are often intolerant of others	.55	30
Religion is mainly a force for bad in the world today	.45	21

Note: r = correlation between the item and the sum of the other items in the scale

Yes % = sum of the agree and agree strongly responses.

* = items reverse coded to calculate r

Table 3

Correlations with personal and psychological factors

	Sex	Age	E	N	P
Worship attendance	.06***	-.00	-.02	.04***	-.13***
Personal prayer	.07***	-.00	-.02**	.05**	-.12***
Rejection of religion	-.07***	.03**	-.01	.09***	.08***
Religious fundamentalism	.13***	-.04***	.03**	.06***	-.12***
Scientific fundamentalism	-.08***	.02	-.01	.02	-.00
Theistic faith	.09***	-.03**	.01	.03***	-.17***
Exclusivism	-.06***	-.01	-.03**	-.03**	.04***
Inclusivism	-.04***	-.01	-.02	-.01	-.00
Pluralism A	.02	-.04***	.00	-.02	-.03***
Pluralism B	.11***	.03***	.04***	-.03***	-.14***
Interreligious	.00	-.01	-.02	.01	-.05***
Atheism	-.16***	.02	-.03***	-.05***	.15***
Agnosticism	.03**	-.00	.02	.00	.07***

Note: ** $p < .01$; *** $p < .001$

Table 4

Regression model: Science disproves the biblical account of creation

	R	Model 1	Model 2	Model 3	Model 4	Model 5
<i>Personal factors</i>						
Sex	-.04***	-.05***	-.06***	-.05***	.01	.01*
Age	.01	.01	.01	.01	-.01	-.01
<i>Psychological factors</i>						
Extraversion	-.03***		-.03**	-.03**	-.03***	-.03**
Neuroticism	.02*		.02*	.03**	-.01	-.01
Psychoticism	-.00		-.01	-.03*	-.03***	-.03***
<i>Religious factors</i>						
Worship attendance	-.10***			-.06***	.01	.01
Personal prayer	-.12***			-.09***	.05***	.04***
<i>Attitudinal factors</i>						
Rejection of religion	.33***				.18***	.18***
Religious fundamentalism	-.18***				-.08***	-.06***
Scientific fundamentalism	.44***				.35***	.35***
Theistic faith	-.21***				-.10***	-.09***
<i>Theological factors</i>						
Exclusivism	-.08***					.02
Pluralism A	-.02					.03
Pluralism B	-.03***					.03
Interreligious	.03***					.04**
Atheist	.16***					.08***
Agnostic	.01					.03
Inclusivism	-.08***					
Total R ²		.0	.0	.2	.24	.25

Note: * $p < .05$; ** $p < .01$; *** $p < .001$

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