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Does devotion to God push you away from science?: Using religiosity to assessing the impact of the religion/science conflict perspective on the choice of academic major among undergraduate students at a religious institution

Jonathan Shephard, Aaron Corbit¹, and Tron Wilder²

Abstract: Religion and science are often perceived to be in conflict. Science is thought to deal with facts and evidence while religion is thought to deal only with faith. This conflict perspective is pervasive in modern society and can manifest itself in many ways. One way it may exert its influence is in the academic decisions made by college students. Students who are less religious may be more likely to choose science majors while those who are more religious may avoid science majors. While research does support this hypothesis in a broad sense, there may be special cases where the impact of the conflict perspective on the academic choices of college students is minimized. One such place may be at overtly religious educational institutions where religious belief permeates all curriculum, including that of science classes. In this study, we used Huber & Huber's (2010) Centrality of Religiosity Scale to measure the religiosity of theology and biology students (N = 122) at Southern Adventist University, a private religious institution near Chattanooga, Tennessee, USA. The goal of this study was to see if the religion/science conflict perspective might be driving educational decisions by looking for differences in religiosity between students in these two disciplines. We found that, though religiosity scores were fairly high for both groups, theology students had higher religiosity scores than did biology students. We also found that theology students tended to maintain high levels of religiosity as age increased, while the religiosity of biology students tended to decrease with age. This implies that the religion-science conflict perspective may drive students' academic decisions and attitudes even at religious institutions that seek to integrate science and faith.

Key words: Religiosity, Religion/Science Conflict, Biology Theology Undergraduates, Christian University

Introduction

In modern society, science is often perceived as incompatible with religious faith. In the minds of many, the very concept of faith is at odds with the basic tenets of science. The idea is that science is based on critical thinking and evidence while the practice of faith means accepting ideas without sufficient evidence. The view of many atheists is that faith is dangerous. As atheist and evolutionary-biologist Richard Dawkins has said, "Faith can be very very dangerous, and deliberately to implant it into the vulnerable mind of an innocent child is a grievous wrong." (Dawkins, 2006). In the United States, this view, that science and faith are in conflict, can be seen in the debates that surround issues of origins because established theories, like the Big Bang

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or Darwinian evolution, are seen as incompatible with certain interpretations of the Bible (Brand & Chadwick, 2016).

This conflict view is widespread in society. About half of individuals surveyed in a recent Gallup poll perceive inconsistencies between science and religious beliefs (Gallup, 2019). Longest and Smith (2011) have detected the formation of this perception in undergraduates and looked at the sociological factors that create or inhibit the formation of a religion-science conflict. Even some religious leaders, who have not opposition to science, have mentioned tensions in certain areas regarding science and religion (Bouveng, 2014). In comparison, Ecklund and Park (2010) suggested that, among scientists, the perception of science vs religion is associated with how they were raised and other scientists' views.

Conflict perspective effects

This conflict perspective has had profound effects. For example, a significantly lower number of Christian students choose natural science college majors in the United States compared to non-Christian students (Barnes, Truong, Grunspan, & Brownell, 2020). Those Christian students that do choose natural science majors are often encouraged by their parents to use that major as a stepping stone to careers in healthcare rather than pursue careers within the natural sciences (Scheitle & Ecklund, 2017). A perceived distrust between atheistic scientists and highly religious individuals has also been documented. As seen in Beauchamp & Rios (2020)'s study, atheists were more trusting to atheistic scientists, and Christians were more trusting to Christian scientists. This could potentially lead to discrimination between religious and non-religious individuals in the natural sciences.

This conflict perspective can also create other subsequent perspectives that become a barrier to undergraduates' learning performance. Research has found a negative correlation between religiosity and scientific literacy (McPhetres & Zuckerman, 2018; Rios et al., 2015) This has led to a perception that highly religious people are less scientifically competent, even though one study (McPhetres & Zuckerman, 2018) suggested that negative attitudes towards science was the predictor of scientific performance, not religiosity.

This perception of conflict between science and religion can affect students' perception. In Scheitle's (2011b) extensive research, he looked at if college students believed that science and religion were at conflict and which side they favored. Students were found to have a conflict perception, and even if students did not share this perception, they favored either science or religion depending on their upbringing.

Religiosity's definitions and instruments

The science-religion conflict perspective is associated with religiosity. Religiosity is defined as the importance of a religion's central elements in a person's life. Instruments that measure religiosity assess an individual's frequency of religious service attendance, the intensity of private religious practices, and how often a person seeks a connection with the divine (Sta. Maria, Chowdhury, & Nizam, 2018). Unlike spirituality, which is the level of perceived personal connection between the divine and the individual, religiosity is more a measure of the time a

person actively engages in the religious practices that characterize their particular religion (Krok, 2015; Sta. Maria, Chowdhury, & Nizam, 2018).

Research has suggested that there is an inverse relationship between religiosity and interest in the natural sciences. Lehman (1974) found that science faculty demonstrated lower levels of religiosity than faculty from other disciplines at both secular and Christian universities. Research also suggests that a higher level of religiosity is associated with lower acceptance of the scientific community's consensus on topics such as the origins of life on Earth and evolutionary theory. It is suggested that this lower acceptance is implanted in students based on their parents' attitude towards religion and science at childhood (McPhetres & Zuckerman, 2018; Evans, 2011). Studies also suggest that natural sciences may have a negative effect on students' religiosity on secular universities (Kimball et al., 2009). Research also suggests that theology undergraduates would have higher religiosity since studies show that undergraduates' religiosity increases over time in this field (Williamson & Sandage, 2009). Christopher Scheitle (2011a) suggests that "if scientists demonstrate lower levels of religiosity, then there must be some inherent conflict between scientific knowledge and religious belief."

While other studies (see above) have shown differences in religiosity between those in the natural sciences and other academic disciplines, these studies may not capture the dynamics of certain Christian universities were a Biblically based worldview is incorporated into all disciplines, even those in the natural sciences. At these universities, it may be that students learn to integrate science and religion in such a way that they cease to feel there is tension between them. This may lead to a situation where levels of religiosity are similar across all academic disciplines.

The purpose of this study is to investigate this religion-science conflict perspective by measuring differences in religiosity between undergraduate students at an overtly Christian university, where a biblically based worldview is incorporated in all disciplines. By comparing the religiosity between undergraduate biology and religion students, this study will seek to detect any differences in religiosity. These differences will indicate whether the religion-science conflict perception that exists among students at a religious institution.

Methods

Undergraduates of Southern Adventist University were the targeted participants of this study. This campus' mission integrates higher education with both a Christian emphasis and environment. The campus's mission statement is "Grounded in Jesus Christ and dedicated to the beliefs of the Seventh-day Adventist Church, we equip students to embrace biblical truth, embody academic and professional excellence, and pursue Spirit-filled lives of service" (Southern Adventist University, 2020). Church attendance and religious and cultural events are mandatory for undergraduates, which controls for differences of religiosity by environment. This campus was ideal to address our research question because faculty in all academic disciplines take the mission of the university seriously and incorporate a unified Seventh-day Adventist Biblical worldview into all their classes (Southern Adventist University, 2020).

Of the numerous instruments that have been developed to measure religiosity (e.g. Krok, 2014; Knox et al, 1998) we chose the Huber & Huber's (2012) Centrality of Religiosity Scale (CRS). This scale has been used in across multiple religions and nationalities and widely cited (Huber & Huber, 2012). The CRS tests the intensity of religiosity in individuals across five dimensions: Intellect, Ideology, Public practice, Private practice, and Personal experience. The Intellectual dimension is the intrinsic knowledge of religion an individual has. Highly religious people will think of religious issues more frequently to interpret and explain what they know. The ideology dimension refers to the level of conviction a person has about the existence of a spiritual deity. The Public Practice dimension refers to an individual's frequency of religious public rituals that are in a religious community. A person's importance of communal religious services is measured in this dimension. The Private Practice dimension is the individual practice of religious rituals, like personal prayer and meditation. This is not looking at the spiritual aspect, such as "how close do you feel to a transcendent deity?" The Private Practice dimension investigates the importance and frequency of these individualistic rituals to a person, such as "How important is prayer/meditation to you?". Lastly, the Personal experience dimension measures how much a person experiences or perceives a deity communicating to them. Where Private Practice looks at person-to-deity communication, Personal experience looks at perceived deity-to-person communication.

This study recruited students from the following class labs: General Biology II, Hebrew II, and Greek II. These labs were chosen to avoid class disruption, and since the labs are mandatory to attend, there was less possibility of students skipping lab. Each student enrolled in the study was given the CRS. We also obtained demographic information from each participant, including race, religion/denomination, gender, class standing, major, and career objective since research suggests that these demographics can also affect religiosity (Knox et al., 1998; Levin, Taylor, and Chatter, 1994; Fitchett et al., 2007; Ecklund & Scheitle, 2007). A description of the study and its goals were read before passing out the survey and an informed consent form was included as the first page of our survey. IRB approval was also attained.

Statistical Methods

We analyzed the data using two statistical models. We first utilized an analysis of covariance (ANCOVA) model to examine which factors affected total religiosity score. This model included class (biology vs. theology), gender, and ethnicity as fixed factors and age as a covariate. Insufficient sample sizes prevented us from exploring interactions involving gender and ethnicity. However, the interaction between class and age was included in the model. Total religiosity score was mirrored and log₁₀ transformed in order account for a substantial negative skew so that we more closely met parametric assumptions.

In order to assess possible differences within the scores for the religiosity subcomponents we utilized a repeated-measures analysis of variance (ANOVA) model. For this model we used the religiosity subcomponent scores as the within-subjects factor and class (biology vs. theology) as a between-subjects factor. As with the previous model, the scores for the religiosity subcomponents were mirrored and log₁₀ transformed.

Analysis was performed using the open source *jamovi* software (version 1.0.7.0, <u>www.jamovi.org</u>) with alpha set to 0.05. For each linear model, we computed effect sizes as partial eta-squared (η^2) Partial eta-squared can be interpreted as percent of variance explained with values of ~0.01, ~0.06, and ≥ 0.14 corresponding loosely to small, moderate, and large effects, respectively (Cohen 1988).

Results

Descriptive Results

In total, 122 participants completed the survey. Of these 28 (23%) were theology students and 94 (77.0%) were biology students. Demographic results are presented in Table 1. Our results showed that theology students tended to be older while biology students were more likely to be younger. Also, female students were sparse in theology classes. A vast majority of students were Seventh-day Adventist in both biology and theology. There were differences in ethnicity detected in this study. In particular, there was a higher percentage of students of Asian descent in biology classes and higher percentage of students of Hispanic/Latino descent in the theology classes. Mixed or 'other' ethnicities were more present in biology than in theology, and Black students were among the lowest in both classes. Comparing between majors, a significantly higher number of Asians were present in biology compared to one person in theology. This pattern is seen through the ethnicities. In both biology and theology, Whites came in as the second largest group. We found that biology had a greater range in ethnicity, sex, and religious affiliation while theology had a greater range of age.

	Biology	Theology
Participants	94 (77.0%)	28 (23.0%)
Mean Age (±SD)	19 (±1.25)	21.5 (±5.74)
Sex		
Male (%)	46 (48.9%)	27 (96.4%)
Female (%)	48 (51.1%)	1 (3.6%)
Religious Affiliation		
Seventh-day Adventist	89 (94.7%)	26 (92.9%)
Baptist	2 (2.2%)	0 (0.0%)
Pentecostal	0 (0.0%)	1 (3.6%)

Table 1. Demographic numbers and percentages of individuals in science and religion classes.

	None/Agnostic	2 (2.2%)	0 (0.0%)	
	No Answer	1 (1.1%)	1 (3.6%)	
Ethni	city			
	Asian	27 (28.7%)	1 (3.6%)	
	White	21 (22.3%)	11 (39.3.4%)	
	Black	6 (6.4%)	1 (3.6%)	
	Hispanic/Latino	22 (23.4%)	13 (46.4%)	
	Other or Mixed	18 (19.1%)	2 (7.1%)	
Class	Standing			
	Freshman	49 (52.1%)	5 (17.9%)	
	Sophomore	24 (25.5%)	5 (17.9%)	
	Junior	15 (16.0%)	12 (42.9%)	
	Senior	6 (6.4%)	6 (21.4%)	

Results from Statistical Modeling

The ANCOVA model (Table 1) showed a significant effect of class (F(1, 112) = 22.31, p < 0.001, $\eta^2 = 0.17$) with theology students having higher total religiosity scores than biology students. This analysis also revealed a significant interaction between age and class (F(1, 112) = 4.61, p = 0.034, $\eta^2 = 0.04$). The data suggest that total religiosity remains relatively constant as age increases for theology students; however, total religiosity decreases with age among biology students (Figure 1). This model did not detect an effect of gender or ethnicity on total religiosity (see Table 1).

The repeated-measures ANOVA (Table 2) model confirmed the significant effect of class, F(1, 119) = 38.2, p < 0.01, $\eta^2 = 0.24$. This model also showed significant differences between religiosity sub-scores, F(4, 476) = 90.78, p < 0.001, $\eta^2 = 0.43$ and a significant interaction between religiosity sub-scores and class, F(4, 476) = 2.86, p = 0.023, $\eta^2 = 0.02$. The specifics of these relationships are shown in figure 2. Tukey's post-hoc tests suggested two homogenous groups within the religiosity subgroups for theology students. Ideology subscores were similar to private subscores (p = 1.00) and public, intellect, and experience subscores were similar (all p > 0.532). The ideology and private sub-scores were significantly greater than the public, intellect, and experience subscores (all p < 0.001).

For biology students the pattern was different. Although ideology and private sub-scores were significantly greater than public, intellect, and experience subscores (all p < 0.001), ideology was also significantly higher than the private subscore (p = 0.010). Another difference was that the

public subscore was significantly greater than the intellect or experience subscores (all p < 0.001) while only intellect and experience subscores were similar (p = 0.997).

	SS	df	F	р	η²
Class	0.15	1	22.31	<.001	0.166
Age	0.01	1	1.64	0.203	0.014
Gender	<.01	1	0.11	0.738	0.001
Ethnicity	0.02	4	4.61	0.597	0.024
Class * Age	0.03	1	4.61	0.034	0.040
Residuals	0.73	112			
Total	1.03	120			

Table 1. Results of ANCOVA model comparing religiosity to class (biology vs. theology), age, gender, and ethnicity among students at Southern Adventist University. P-values less than 0.05 in bold.

Table 2. Results of Repeated Measures ANOVA comparing the five religiosity dimensions (Ideology, Private, Public, Intellect, and Experience) between classes (theology vs. biology) at Southern Adventist University. P-values less than 0.05 are in bold.

	Sum of Squares	df	Mean Square	F	р	η²
Within Subjects Effects						
Religiosity Dimensions	3.60	4	0.90	90.78	<.001	0.43
Religiosity Dimensions * Class	0.11	4	0.03	2.86	0.023	0.02
Residual	4.71	476	0.01			
Between Subjects						
Class	1.83	1	1.83	38.20	<.001	0.24
Residual	5.70	119	0.05			



Figure 1. Scatterplot of age and total religiosity score between biology and theology students at Southern Adventist University. Best fit lines for each group are present with the grey region showing 95% confidence intervals.



Figure 2. Mean scores along the five dimensions of religiosity and total religiosity between biology and theology students at Southern Adventist University. Error bars show 95% confidence intervals.

Discussion

Despite both biology and theology students having relatively high religiosity scores, a significant difference was still found between both groups. Theology students showed higher scores across all dimensions of religiosity compared to biology students. This difference suggests that a religion-science conflict perspective is on Southern's campus, even with the overtly Christian environment, thus affecting the religiosity levels. These findings could also suggest that highly religious students avoid natural sciences, which could affect both religion and biology department on the campus. McPhetres and Zuckerman (2018) mentioned this science avoidance in their study that showed higher religiosity correlated with higher negative attitudes towards science. These findings, according to Figure 2. are also consistent with Ecklund and Scheitle's (2007) study which saw lower religiosity among scientists compared to general population.

Patterns in the scores between the dimensions of religiosity were also uncovered. Perhaps the most significant of these is that, for both theology and biology students, the 'Ideology' and

'Private Practice' scores were higher than the 'Public Practice', 'Intellect', and 'Personal Experience' scores. This suggests students are more secure in their personal beliefs and private expression of their faith than they are with publicly expressing their faith, engaging intellectually with their faith, and personal feelings of connection to God. In contrast, Francis's (1997) study that looked into the effect of prayer and church attendance on undergraduates' personality suggested that we would not see a difference.

Another pattern of interest is that, while the scores for the 'Public Practice,' 'Intellect,' and 'Personal Experience' dimensions were similar for theology students, the 'Intellect' and 'Personal Experience' dimensions were significantly lower than the 'Public Practice' dimension for biology students. Theology students, while higher in all dimensions, also showed a greater regard for ideology and private practice than public practice, intellect, and experience, as shown by Figure 2. This finding suggests that theology students have a high overall religiosity, but still maintain different values of certain aspects of religion, similar to biology students. An interesting difference in the intellect dimension could be attributed to the artifact of the theology major, which has high religious content. However, a similar difference across all dimensions would have to be seen to support this hypothesis.

It was noticed that Biology students tended to decrease with religiosity over age, according to Figure 1. Marín and D'Elía (2016) noticed the same trend in their study of non-religiosity and acceptance of evolution in Chilean undergraduates. Their students showed that as students aged, scientific acceptance increased, but religiosity decreased. In contrast, Theology students either maintained or increased in their religiosity, a trend seen in Williamson and Sandage (2009) as well. Williamson and Sandage (2009), which saw a steady increase of religiosity in seminary students, found the same trend. However, this finding may be an anomaly due to the fact that most students taking these labs were freshmen.

Limitations and Unknowns

A couple weaknesses and unknowns were detected after the study was performed. Because this study only investigates theology and biology majors, it gives no picture of the religiosity of the entire campus for comparison. We cannot suggest that biology students are less religious or that theology students are more religious compared to the rest of the campus. More extensive survey would detect any problems between these majors.

Gender was severely limited in this study due to the presence of one woman in theology. Therefore, we cannot compare the majors using gender. This discrepancy could be caused by church politics on the ordination of women within many denominations, and in addition, theology has been male dominated for years (Kupke, 2013). For the Seventh-day Adventist denomination, church politics on woman's ordination has been a recent debate. More inclusive theology programs for women would be needed to accurately compare the two.

In the demographics, we used very broad metrics. For example, because Southern's campus is highly diverse, we could not record the subgroups within the black community, such as Caribbean American or African native. Yet since a low number of blacks were present, it did not greatly affect the data collected. However, greater representation of all minorities is a matter

for concern. With age, biology students in this particular biology lab were heavily freshmen while theology students surveyed were juniors. Because the theology labs taken were either all freshman one year or all juniors the next, the age range for theology students ranged greatly. Biology students were largely freshman, limiting the age range.

It is unclear how Southern's campus compares to other non-religious campus, such as University of Chattanooga. Looking at the effect of overtly Christian campuses on students' religiosity would help to better understand how the religion-science conflict perspective is held. It is likely, in regard to the literature, that Education majors and Humanities will be markedly more religious than many natural science majors (Kimball et al., 2009).

Conclusion

In this study, we were able to show a difference in religiosity between theology students and biology students. This difference suggests that a religion-science conflict perspective could be present on campus. The results confirm our preliminary assumptions that theology students would display a higher religiosity than biology students. By surveying undergraduates' religiosity, we were able to assess the religiosity that could influenced by this religion-science conflict perspective. Understanding this perception will better help us understand college students' perception of both religion and science, particularly Southern Adventist University.

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