

Endorsement of Religion–Science Conflict as an Expression of Group Solidarity among Graduate Students in the Sciences

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Why do some individuals perceive religion and science as being in conflict while others do not? Research suggests that individuals' endorsement of religion–science conflict is often as much an expression of identity and group membership as it is an intellectual assessment of the relationship. This study examines this dynamic among graduate students in five science disciplines in the United States. An analysis of original survey data finds that students who both identify strongly with science and believe that others in their scientific discipline are hostile toward religion are more likely to say that religion and science are in conflict and that they are on the side of science. This suggests that endorsements of religion–science conflict are a way for students to express solidarity with a group that is important to their identity.

Key words: identity; religion; science; conflict; graduate students.

The idea that religion and science are inherent enemies is prominent in American culture and in the scholarly literature (Hardin, Numbers, and Binzley 2018). Indeed, the two institutions are commonly fused together as a standalone topic of discussion and analysis (i.e., “religion and science” or, often, “religion vs. science”). The secularization thesis played a prominent role in fueling discourse about the supposed religion–science conflict, as it predicted that religiosity will inevitably decline over time due to increased scientific knowledge (Albrecht and Heaton 1984; Berger 1967; Tschannen 1991; Wilson 1982; see also Gorski and Altinordu 2008 for a review). The implication of this is that science and religion

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are intrinsically and irrevocably in conflict due to differing empirical and epistemological claims. Yet, conflict between science and religion is as much social and cultural as it is intellectual, evidenced in part by variation across contexts in the extent to which the two are viewed as conflicting (Ecklund et al. 2016, 2019).

Social scientific studies of religion have identified how religious subcultures create symbolic boundaries between themselves and the outside world, including science, to maintain and support their deviant worldviews, values, and behaviors (Smith et al. 1998; Stark and Finke 2000). The scientific community is no different, as it has its own distinct values and behaviors that constitute a subculture (Ashforth and Mael 1989; Stets and Burke 2000). This scientific subculture is supported through symbolic differentiation from the outside world, including from religion (Wuthnow 1985). Thus, viewing science and religion as being in conflict serves to reinforce the scientific community's subculture and identity as well as the plausibility of its worldview (Wuthnow 1985). When science and religion are not considered in conflict a priori, it opens up the possibility that the public and scientists may vary in their perceptions of a conflict between science and religion, which can then be modeled.

In fact, U.S. surveys have tended to show that the majority of individuals say that they do not personally see religion and science as having a conflictual relationship (Scheitle 2011). Scheitle and Ecklund's (2017) survey of a sample of U.S. adults, for instance, found that only 27% of individuals say that they see religion and science as in conflict with each other. This group is fairly evenly split between those who say that they are on the side of science in this conflict and those who say that they are on the side of religion.

While much research has described individuals' views on the religion–science relationship, relatively little research has attempted to explain *why* individuals do or do not perceive conflict between religion and science. There are, though, some examples of such research (Baker, Perry, and Whitehead 2020; Mehta, Thomson, and Ecklund 2020). Baker (2012), for instance, found that African Americans and individuals with lower incomes are more likely to hold a pro-religion conflict perspective. Baker interprets this pattern as resulting, in part, from these groups' lower access to institutional science and their perception that those who are part of institutional science represent a symbolic outgroup. In other words, individuals' expressions of perceived conflict between religion and science are more an expression of identity and group membership than about some intellectual assessment of conflict.

The study presented here builds upon this idea by considering how individual identity and group culture influences science students' likelihood of saying that religion and science are in conflict with each other. Using an original survey of graduate students across five disciplines, we first examine how the salience of a student's identity as a scientist influences their perception of religion–science conflict. We then consider how a student's perception that others in their discipline have a negative attitude toward religion influences their perception of religion–science conflict. Finally, we examine how these two factors interact with

each other. Is the effect of a highly salient identity as a scientist on perceived religion–science conflict amplified if a student thinks that others in their discipline have a negative attitude toward science? Such a moderating effect would suggest that a science student’s expression of perceived conflict between religion and science is, in part, an expression of their desire to be a part of a scientific community that they perceive to be hostile toward religion.

THE SCIENTIST IDENTITY

For some, identifying with science is “a central part of their process of moral reasoning, existential beliefs, and sense of selfhood” (Jones et al. 2020:593). That is, science is an important part of their identity. In the scientific community specifically, the scientist identity is an important analytical lens into “science as a community of practice” with corresponding group norms (Carlone and Johnson 2007:1189). Identity refers to “cognitive schemas” regarding one’s self, positions in society, and group affiliations (Peek 2005; Stryker 2008). Identities are not states of being, but are dynamic and can change based on new environments, relationships, roles, and interactions. Identities are socially constructed through interactions that are tied to roles (Stryker 2008). Individuals internalize the “meanings and expectations associated with a role,” which make up their identities (Stryker and Burke 2000:289). As individuals reside in multiple networks of relationships and play out many different roles, they also have many different identities (Stryker and Burke 2000). The likelihood of an identity being enacted depends on its location in an individual’s salience hierarchy of identities with higher ordered identities being more likely to be invoked (Stryker 2008). How salient an identity is reflects one’s commitment to the social ties and roles that define it—“to the degree that one’s relationships to a set of others depends on being a particular kind of person and playing out particular roles, one is committed to being that kind of person” (Stryker 2008:20). Roles and their corresponding identities arise from participation in social networks, groups, and communities.

Participating in the scientific profession is in many ways no different from joining other types of groups. Indeed, as with many professions, entering the scientific profession comes with an implied membership and adherence to a group that is distinct in values, behaviors, and interests (Ashforth and Mael 1989; Stets and Burke 2000). These values, norms, and behaviors constitute a subculture that is reinforced by a scientific worldview/reality that is constructed by the scientific community. Wuthnow (1985) argues that science is just as much a constructed reality as anything else and it competes with the reality of everyday life. Socially constructed realities and worldviews that are not shared by all members of society need plausibility structures to support them (Berger 1967). Just as religious subcultures develop and maintain their worldviews and identities through the creation of symbolic and physical boundaries that differentiate themselves from the outside world (Smith et al. 1998), so too does the scientific community,

which constructs external symbolic boundaries to clearly differentiate scientific worldviews, orientations, and identities from those that are commonplace in everyday life, including religion (Mehta, Thomson, and Ecklund 2020; Wuthnow 1985). Viewing religion as “other” and science and religion as in conflict contributes to maintaining the plausibility of the scientific subculture.

RELIGION AS AN “OTHER” FOR SCIENCE

Although often lost within the larger conflict narrative, apparent or potential conflicts between religion and science occur along different dimensions and in different domains. There is a tendency to focus on a supposed inherent conflict between the competing epistemological and metaphysical assumptions of religion and science. That is, each offers distinct methods to understanding reality, and the dominance of one truth comes at the expense of the other (Barbour 1997). Yet, Catto et al.’s (2019) review of the literature highlights how knowledge of science does not equate to acceptance of science (Allum et al. 2014; Johnson, Scheitle, and Ecklund 2015); instead several studies have found that moral, social, and political factors may more so drive perceptions of conflict between religion and science than epistemology (Allgaier 2012; Evans 2011, 2018; Johnson, Scheitle, and Ecklund 2015). Thus, beyond the supposed epistemological conflict, there can also be conflicts of a more social and political nature, as religion and science compete for institutional and cultural power (Catto et al. 2019; Evans and Evans 2008; Evans 2011).

Although religion and religious institutions played a role in the early development of science, it is also the case that science was established as a separate institution by distancing itself from religion (Gieryn 1988). That is, the birth of science as a standalone institution was made possible through the creation of a boundary between itself and other institutions, with the boundary between itself and religion arguably being the most important (Gieryn 1983). Such boundaries are not entirely stable, though, as different actors probe their limits and weaknesses, often resulting in a conflict and reinforcement of the boundary (Aechtner 2015; Gieryn 1999).

While not all scientists personally take the position that religion or religious people are a distinct “other” in opposition to themselves, there is an awareness that the professional culture of science holds this position. Aechtner’s (2015) analysis of anthropology and sociology textbooks, reference materials, and nonintroductory publications finds pervasive religion–science conflict narratives, thereby suggesting that such narratives are being propagated within these scientific disciplines. Another indication of this comes from Ecklund’s (2010) interviews with academic scientists. In these interviews, Ecklund found that it is quite common for religious scientists to feel a distinct pressure to hide or suppress their identities, beliefs, and practices. This “closeted faith” is in response to a perception that revealing one’s religiosity would be perceived as a sort of betrayal of

one's membership in the scientific community. Or, in other words, many scientists feel like being religious blurs the boundary between science and religion, if not in their judgment then in the judgment of their scientific peers.

Seeing religion as an incompatible “other,” if not as an outright enemy, then, could form a key component of how a scientist signals their membership in the scientific community. Merton (1942:126) noted that “organized skepticism” forms a key component of the “scientific ethos” and the membership in the scientific community. As he argues, “[i]nstitutional symbols and values demand attitudes of loyalty, adherence, and respect...whether it be the sacred sphere of political convictions or religious doctrines or economic claims, the scientific investigator does not conduct himself in the prescribed fashion.” Viewing science and religion as in conflict serves as a “boundary-posturing mechanism,” which creates “a diffuse social space in which the scientist can function and with which the scientist identifies as a person” (Wuthnow 1985:196). At the early stages of one's career as a scientist, when one is just entering into the “scientific role,” boundary-posturing mechanisms should be the most important for signaling one's commitment to the scientific subculture and its corresponding identity (Wuthnow 1985:196). Given this, the more graduate students identify with science—that is, the more salient science is as an identity—the more likely they should be to be the “kind of person” prescribed by the scientific role, that is, the more likely they should be to accept the attitudes of the scientific community regarding religion and science conflicting and being on the side of science. Because of this, they should be more likely to report a pro-science conflict position.

Hypothesis 1: Graduate students' strength of identification as a scientist will be positively associated with reporting a pro-science conflict position.

While religion serves as an “other” for the scientific community, the extent to which scientists perceive this likely varies based on their more immediate interactions with others in their discipline. Some scientific communities may be more likely to use “boundary-posturing mechanisms” to distinguish themselves from everyday life through the increased othering of religion (Wuthnow 1985). In these communities, their disciplinary subculture may be supported by an acceptance of science and religion as incompatible along with negative views of religion. Perceptions of one's disciplinary views of religion may derive from the actual boundary-posturing of the disciplinary community or more proximately from past experience with other scientists in their discipline including their mentor, or their departmental culture. Science is an extremely collaborative enterprise (Ecklund, Park, and Veliz 2008; Ecklund and Park 2009), so we expect that perceptions of one's disciplinary views of religion would be heavily influenced by one's perceptions of how the people in their discipline view religion.

While science graduate students are gaining technical knowledge and skills, they are also joining a social group. This group is most immediately represented by the student's faculty and graduate student peers, but it also extends to their larger disciplinary community and the scientific community in general. The perceived

beliefs, behaviors, and norms of this social group can be important as students look to be accepted within the group. If a student perceives that the norm within the group is to think or act in a certain manner, then the student may adjust their own attitudes and actions to reflect that perception. Graduate students who perceive that people in their discipline hold very negative views of religion should be more likely to share their discipline's attitudes through socialization into group norms and direct interaction with disciplinary scientists with such views, who serve as data points for establishing that viewpoint. As such, we expect that graduate students who perceive their discipline as having more negative attitudes toward religion will be more likely to perceive religion and science as being in conflict and to be on the side of science (i.e., pro-science conflict position).

Hypothesis 2: Graduate students' perception that their discipline has a negative attitude toward religion will be positively associated with reporting a pro-science conflict position.

Roles, which are internalized as identities, are embedded within groups that provide "context for the meanings and expectations associated with the role" (Stryker and Burke 2000:289). Given that identities are socially constructed and are shaped by one's group affiliations, we expect that graduate students' perception of their discipline's negative attitude toward religion will condition the relationship between identification with science and perception of religion–science conflict. The "kind of person" prescribed by one's scientific discipline in regards to religion (i.e., the meanings and expectations connected to being a scientist) will vary based upon that discipline's own attitudes toward religion (Stryker 2008:20). The more one identifies as a scientist in a discipline that is perceived to view religion negatively, the more likely s/he should be to view religion and science as in conflict and take a pro-science position. Thus, graduate students who more strongly identify with science, that is, those for whom the scientist identity is most salient, and find themselves in a discipline that they perceive as evaluating religion negatively, should be more likely to view religion and science as in conflict and be on the side of science compared to graduate students with the same level of scientific identification but who perceive their discipline as viewing religion less negatively.

Hypothesis 3: Graduate students with a strong identification as a scientist will be more likely to report a pro-science conflict position if they perceive that their discipline has a negative attitude toward religion.

DATA AND MEASUREMENT

Data for this study come from a survey of graduate students fielded in spring of 2019 that was designed by the first author and supported by a grant from the National Science Foundation. The sample of students was constructed in two stages. In the first stage, a sample of departments was selected. The top 60 graduate programs in five disciplines were identified using U.S. News and World Report

rankings. The five disciplines were: biology, physics, chemistry, psychology, and sociology. The goal of the department-level sampling was to generate variation in the material and cultural characteristics of departments across levels of prestige. However, we also did not want to compare apples and oranges, which might result from, say, comparing students in the #1 department with students in the last ranked department. As a result, we sampled from the top 60 departments in each discipline, which still allowed for variation in the departments sampled. The top 60 departments for each discipline were stratified into four tiers (i.e., 1–15, 16–30, 31–45, and 46–60), and three departments were randomly selected within each tier. This produced 12 departments per discipline and 60 departments in total. The second stage of constructing the sample frame consisted of using online department directories of graduate students to build a database of students. This process resulted in a frame of 6,466 students. From this frame, 800 students from each discipline, 4,000 in total, were randomly selected to receive the survey. Students received a unique link to the survey through email and were offered a \$5 Amazon.com gift code for completing it. In the end, 1,307 complete responses and 72 partial responses were received, which represents an overall response rate of 35.9% (AAPOR Definition #4). Weights were constructed after data collection to account for the disproportionate sampling of students across the five disciplines and for patterns of non-response based on the discipline–gender–tier categories observed in the full sample frame.

Outcome

The outcome examined in this study came from a question asking graduate students, “For me personally, my understanding of religion and science can be described as a relationship of... (1) Conflict; I consider myself to be on the side of religion; (2) Conflict; I consider myself to be on the side of science; (3) Independence; they refer to different aspects of reality; (4) Collaboration; each can be used to help support each other.” This question mirrors items that have appeared in prior studies examining different populations’ perceptions of the religion–science relationship (e.g., Scheitle 2011; Scheitle and Ecklund 2017). Given this study’s theoretical interests, we are most interested in the second response to this question. Only five students chose the first response. We exclude these cases from the analysis. Because we are not particularly interested in the differences between the third and fourth response for this study, we combine these into a “no conflict” category. In sum, our outcome measure is coded as (0) no conflict between religion and science (i.e., either independence or collaboration) and (1) conflict between religion and science, I am on the side of science (i.e., pro-science conflict position).

Strength of Identification with Science

Our first hypothesis concerns how a graduate student’s strength of identification with science—salience of a scientist identity—influences their perception of religion–science conflict. We assess this concept with three items that

appeared on the survey, which were modeled on prior studies of student identification with science (e.g., Chemers et al. 2011; Robnett, Chemers, and Zurbriggen 2015). Students rated their level of agreement with the following statements: (1) Overall, being a scientist has a lot to do with how I feel about myself; (2) In a group of scientists, I really feel that I belong; and (3) I have come to think of myself as a scientist. Responses were coded from (1) Strongly disagree to (5) Strongly agree. The mean response across these three items was computed into a scale with a Cronbach's reliability score of .78.

Perception of Disciplines' Negative Attitude toward Religion

Our second hypothesis concerns the role that a graduate student's perception of their discipline's attitudes will have on the student's own perception of conflict between religion and science. We measure perceived disciplinary attitudes using a single question on the survey that asked respondents, "How much do you agree or disagree with the following statement: In general, I feel that people in my discipline have a negative attitude toward religion." Responses were coded from (1) Strongly disagree to (5) Strongly agree.

Religion

Given the nature of the issue being examined in this study, it is logical to think that the religious characteristics of a graduate student might be a significant influence of their perception of the religion–science relationship. To account for this, we include a measure of students' self-reported religiosity, a measure of their belief in God, and a measure of their religious identity. The religiosity measure comes from a question asking students, "Independently of whether you attend religious services or not, would you say you are... (1) Not a religious person, (2) A slightly religious person, (3) A moderately religious person, or (4) A very religious person." The belief in God measure comes from a question asking students, "Please indicate which statement below comes closest to expressing what you believe about God. Would you say..." Possible responses were (1) I don't believe in God, (2) I don't know whether there is a God and I don't believe there is any way to find out, (3) I don't believe in a personal God, but I do believe in a Higher Power of some kind, (4) I find myself believing in God some of the time, but not at others, (5) While I have doubts, I feel that I do believe in God, and (6) I know God really exists and I have no doubts about it.

The religious identity question asked respondents, "Religiously, do you consider yourself to be Protestant, Jewish, Mormon, Muslim, not religious, or something else?" Students were provided 16 possible responses including a "something else" response. In research examining the general U.S. population, the Protestant category represents the largest group and is therefore often sub-divided to distinguish between, say, liberal/mainline and evangelical/conservative Protestants. However, only 6.8% of the graduate students in our sample identify as Protestant. A follow-up question asked students to provide a specific denominational affiliation, but most of these responses were either too generic to classify (e.g.,

“Methodist”) or were denominations associated with more liberal/mainline Protestant traditions. Given all of this, we leave the Protestant category as a single group. This is in line with other research examining religion among scientist populations (Scheitle and Ecklund 2018).¹

Controls

In addition to the measures described above, the analysis includes several other control measures. Some of these controls represent demographic characteristics of the students. For instance, differences in religiosity are often found across gender and racial or ethnic groups (Schnabel 2018), which could influence attitudes toward religion and science. This includes student gender, measured as (1) female, (2) male, or (3) other, as well as student race or ethnicity, measured as (1) White, European, and Caucasian; (2) Black, African, and Caribbean; (3) East Asian (e.g., Chinese, Japanese, and Korean); (4) South Asian (e.g., Indian, Pakistani, and Bangladeshi); (5) Hispanic or Latino; and (6) other or multiple races/ethnicities. Note that the survey included responses for American Indian/Alaska Native and Central Asian/Arab, but there were a small number of students in these categories, so they were recoded to the last category. The analysis also includes measures for student age and family status, both of which have also been shown to be associated with religiosity or attitudes toward science (Pew Research Center 2015, 2018; Thornton, Axinn, and Hill 1992). We also include measures of family status, including the student’s marital status measured as (1) No, I do not have a spouse or partner, (2) Yes, I am in a committed relationship, and (3) Yes, I am married. Also measuring family status is a control for how many children the student has had, ranging from 0 to 4 (“4 or more”).

Another group of control variables represent students’ professional characteristics, as past research on scientists’ religiosity and attitudes toward religion have often focused on issues related to scientists’ status, prestige, and discipline (Ecklund and Scheitle 2007; Ecklund, Scheitle, and Peifer 2018). Included in these controls is a measure representing the number of years the student has been in their current graduate program. This ranges from 1 to 8, with the latter representing “this is my eighth year or more.” Also included is a measure representing “the number of articles, solo-authored or co-authored, that [the student has] published or have had accepted for publication in refereed journals.” On the survey, the respondents were able to enter any numerical value, which was recoded here due to the skewed nature of the responses so that 5 represents “5 or more publications.” We also include indicators representing the discipline that the student is in, which is taken from the sample frame. Biology serves as the

¹We would expect that more conservative or evangelical Protestant individuals would be more likely to endorse a pro-religion conflict perspective rather than a pro-science conflict perspective. As noted in the discussion of the outcome measure, such a pro-religion conflict perspective was almost non-existent in this sample.

reference category in the analysis. Finally, we include indicators representing the region of the university that the student is attending.²

RESULTS

Table 1 presents descriptive statistics for the measures utilized in this study. All analyses are conducted in Stata/SE 15.1 and utilize the software's complex survey command to account for the data's sample structure (e.g., clustering of individuals in departments) and weighting. After removing cases with missing data on the measures utilized in this study, the sample consists of 1,248 individuals.

At the top of table 1, we see that 28.9% of graduate students say that religion and science are in conflict with each other and that they are "on the side of science." This means that 72.1% of graduate students perceive religion and science as being independent from or in collaboration with each other. This is actually in line with other studies showing that the majority of individuals do not openly express the position that religion and science are in conflict with each other (Baker 2012; Scheitle 2011). While the conflict narrative dominates so much of the conversation regarding the religion–science relationship, most people do not actively adhere to this position. This is apparently the case for the graduate students in this study as well.

The mean on the strength of identification with science scale is 3.71, which indicates that on average students leaned toward agreeing with the three items in the scale. For the statement, "Overall, being a scientist has a lot to do with how I feel about myself," for example, 40.3% of the students agreed and another 21.1% strongly agreed. The mean on the perception of discipline's negative attitude toward religion is 3.17. This consists of 9.3% of respondents who strongly disagreed, 16.4% who disagreed, 30.7% who neither agreed nor disagreed, 34.4% who agreed, and 9.2% who strongly agreed that "people in my discipline have a negative attitude toward religion."

The mean on the religiosity measure indicates a relatively low level of subjective religiosity among graduate students in the sciences. Indeed, 65.9% stated that they are "not a religious person" and only 6.7% replied that they are "a very religious person." This is reflected in the religious affiliation percentages seen in table 1. Over 60% of the graduate students chose one of the non-religious identity responses, such as not religious (29.7%), agnostic (12.5%), or atheist (20.8%).

While actual disciplinary differences in perceived religion–science conflict or perceived negative attitudes toward religion are not the focal concern of this study, table 2 presents some descriptive statistics for our primary measures broken out by discipline for interested readers. We see, for instance, that sociology students are the least likely to endorse a pro-science conflict perspective (23.1%),

²Controlling for funding status does not affect the findings (results not shown).

TABLE 1 Descriptive Statistics

	Mean or percentage	Linearized standard error	Min–max
Pro-science conflict position	28.9%		
Strength of identification with science	3.71	0.03	1–5
Perception of discipline's negative attitude towards religion	3.17	0.04	1–5
Religiosity	1.60	0.03	1–4
Belief in God	2.69	0.07	1–6
<i>Religious affiliation</i>			
Protestant	6.8%		
Catholic	8.7%		
Just a Christian	5.9%		
Jewish	4.3%		
Muslim	1.4%		
Buddhist	1.3%		
Hindu	2.6%		
Not religious	29.7%		
Agnostic	12.5%		
Atheist	20.8%		
Something else	6.0%		
<i>Gender</i>			
Female	44.9%		
Male	53.3%		
Other	1.8%		
<i>Race–ethnicity</i>			
White, European, Caucasian	63.1%		
Black, African, Caribbean	3.5%		
East Asian (Chinese, Japanese, Korean)	14.6%		
South Asian (Indian, Pakistani, Bangladeshi)	5.3%		
Hispanic or Latino	4.4%		
Other or multiple	9.1%		
Age	28.4	0.23	22–61
<i>Marital status</i>			
Not in a relationship	35.9%		
In a committed relationship	40.3%		
Married	23.8%		
Number of children	0.10	0.01	0–4
<i>Discipline</i>			
Biology	21.9%		
Chemistry	28.3%		
Physics	21.6%		
Psychology	15.1%		
Sociology	13.1%		

TABLE 1 Continued

	Mean or percentage	Linearized standard error	Min-max
Years in program	3.9	0.08	1-8
Publications	2.0	0.09	0-5
Region of university			
Northeast	27.3%		
Midwest	30.7%		
South	17.0%		
West	25.0%		

Note: $N = 1,248$. Analyses take into account the data's complex survey structure and weighting.

while physics students are the most likely to endorse such a perspective (36.6%). Physics students are also the most likely to say that those in their discipline have a negative attitude toward religion (54.7%), while chemistry students are the least likely to say this about those in their discipline (33.3%). Finally, we see that biology (3.87), chemistry (3.77), and physics (3.81) students all have relatively high mean identification with science scores, while psychology (3.64) and especially sociology students (3.20) have lower means on this scale.

We now turn to [table 3](#), which presents logistic regression models predicting graduate students' perception that religion and science are in conflict and they are on the side of science.³ The results from these models are presented as odds ratios (ORs), so that a value above 1 represents an associated increase in the odds of a student reporting a pro-science conflict position and a value below 1 represents a decrease in the odds of a student reporting a pro-science conflict position.

Model 1 presents a first test of Hypothesis 1. We see that a graduate student's strength of identification with science is significantly associated with an increase in the odds of the student reporting a pro-science conflict position net of the other measures in the model ($OR = 1.32, p < .01$). This provides support for Hypothesis 1. Before turning to the other hypotheses, it is worth examining the other effects seen in Model 1. As might be expected, graduate student religiosity is significantly associated with a decrease in the odds of reporting a pro-science conflict position ($OR = .23, p < .01$). A similar effect is seen for the belief in God measure ($OR = .57, p < .01$). Net of the religiosity and belief in God measures, we do not find any significant differences in the odds of endorsing a pro-science conflict perspective across religious traditions relative to Protestant students.

³Interested readers can find results for multinomial regression models predicting a three category dependent variable (i.e., conflict, independence, and collaboration) in [supplementary table S1](#). The results for the hypothesized variables predicting perceived conflict compared to independence mirror those presented for the logistic regression models.

TABLE 2 Descriptive Patterns for Focal Measures by Discipline

	Discipline					Overall
	Biology	Chemistry	Physics	Psychology	Sociology	
Percentage saying religion and science are in conflict and that they are on the side of science	29.2% [21.3%–38.7%]	23.3% [15.6%–33.4%]	36.6% [30.6%–43.0%]	33.0% [28.1%–38.3%]	23.1% [17.6%–29.6%]	28.9% [25.2%–32.9%]
Percentage agreeing that those in their discipline have a negative attitude towards religion	46.6% [36.6%–56.9%]	33.3% [25.9%–41.7%]	54.7% [48.9%–60.4%]	41.8% [34.4%–49.6%]	43.9% [37.7%–50.4%]	43.5% [39.1%–48.1%]
Mean strength of identification with science	3.87 [3.79–3.95]	3.77 [3.64–3.91]	3.81 [3.69–3.92]	3.64 [3.55–3.74]	3.20 [3.03–3.37]	3.71 [3.63–3.78]

Note: N = 1,248. Analyses take into account the data’s complex survey structure and weighting; 95% confidence intervals are presented in brackets.

TABLE 3 Logistic Regression Models Predicting Graduate Students' Endorsement of Religion–Science Conflict on the Side of Science (Odds Ratios)

	Model 1	Model 2	Model 3	Model 4
Strength of identification with science	1.32**		1.35**	0.63
Perception of discipline's negative attitude towards religion		1.31**	1.33**	0.53*
Strength of identification with science × perception of discipline's negative attitudes towards science				1.27**
Religiosity	0.32**	0.31**	0.31**	0.30**
Belief in God	0.57**	0.56**	0.56**	0.56**
<i>Religious affiliation</i>				
Protestant (ref.)				
Catholic	1.57	1.56	1.61	1.67
Just a Christian	0.50	0.48	0.51	0.54
Jewish	1.44	1.45	1.55	1.50
Muslim	0.62	0.54	0.61	0.64
Buddhist	0.55	0.53	0.52	0.56
Hindu	0.32	0.27	0.31	0.28
Not religious	0.91	0.94	0.97	0.97
Agnostic	1.44	1.54	1.60	1.62
Atheist	1.83	1.90	1.98	1.97
Something else	1.90	1.83	1.87	1.88
<i>Gender</i>				
Female (ref.)				
Male	1.40	1.44	1.41	1.45
Other	1.03	1.02	1.03	1.04
<i>Race–ethnicity</i>				
White, European, Caucasian (ref.)				
Black, African, Caribbean	1.27	1.25	1.43	1.32
East Asian (Chinese, Japanese, Korean)	0.84	0.95	0.97	0.97
South Asian (Indian, Pakistani, Bangladeshi)	2.02	2.38	2.21	2.20
Hispanic or Latino	1.19	1.26	1.19	1.17
Other or multiple	0.96	0.96	0.97	0.96
Age	0.98	0.98	0.98	0.98
<i>Marital status</i>				
Not in a relationship (ref.)				
In a committed relationship	0.76	0.72	0.72	0.72
Married	0.98	0.95	0.94	0.94
Number of children	0.90	0.95	0.94	0.95
<i>Discipline</i>				
Biology (ref.)				
Chemistry	0.79	0.83	0.86	0.90

TABLE 3 Continued

	Model 1	Model 2	Model 3	Model 4
Physics	0.94	0.89	0.93	0.93
Psychology	1.44	1.40	1.51	1.56
Sociology	0.60	0.54*	0.66	0.67
Years in program	1.14*	1.12*	1.13*	1.14*
Publications	0.81**	0.82**	0.81**	0.81**
Region of university				
Northeast (ref.)				
Midwest	0.62	0.65	0.64	0.64
South	1.15	1.24	1.19	1.21
West	1.45	1.39	1.40	1.41

Notes: $N = 1,248$. Analyses take into account the data's complex survey structure and weighting.

* $p < .05$; ** $p < .01$.

We find no significant demographic associations in Model 1, as male and other gender students do not differ from female students in their likelihood of reporting a pro-science conflict position, nor do any of the racial and ethnic groups differ relative to white students. There is no significant age association, marital differences relative to students who are not in a relationship, or a significant association with number of children.

Looking at the professional-related measures, we find that students who have been in their graduate programs longer have greater odds of reporting a pro-science conflict position ($OR = 1.11, p < .05$). We do not find any significant differences across disciplines relative to biology students. In alternative models (not shown) with psychology as the reference category, we find that sociologists have significantly lower odds of reporting a pro-science conflict position ($OR = .44, p < .05$). Using 1969 Carnegie Commission survey data, [Stark, Iannaccone, and Finke \(1996\)](#) found that, of the social and hard sciences, faculty in Anthropology and Psychology were the least religious and most opposed to religion with Sociology coming in third. While we can only speculate, it may be the case that Psychology more strongly socializes their students into anti-religion beliefs that support a conflict position compared to Sociology. We find that the number of articles a student has published is significantly associated with reduced odds of reporting a pro-science conflict position ($OR = .82, p < .01$). This finding is noteworthy as some past studies have suggested that particularly talented or successful students are more likely to view religion and science as incompatible ([Stark 1963](#)).⁴ To the extent that publishing articles is an indicator of graduate student talent or success,

⁴While [Stark's \(1963\)](#) data are outdated, we know of no other data addressing this topic.

the finding in Model 1 does not support this contention. The negative association between publications and perceiving conflict may be due to publications affording some professional identity security; graduate students with more publications may already have external validation for their scientist identity and thus, may feel less pressure to adopt the conflict position as a boundary posturing mechanism.

Model 2 excludes the identification with science measure and enters the graduate student's perception of their discipline's negative attitude toward religion measure to assess Hypothesis 2. In support of this hypothesis, the analysis finds that perceiving a negative attitude toward religion in their discipline is associated with greater odds that they will say that religion and science are in conflict with each other and they are on the side of science ($OR = 1.31, p < .01$). Is this because students who identify more strongly with science are more likely to think their discipline has a negative attitude toward religion? We will examine the independent effects of each predictor momentarily. First, though, we see that most of the effects seen in Model 1 for the religion-related and control measures are the same in Model 2. In particular, religiosity and belief in God are associated with reduced odds of reporting a pro-science conflict position. We do see that the difference between biology and sociology students becomes statistically significant in Model 2, with the latter group having lower odds of endorsing a pro-science conflict position.

Model 3 includes both the identification with science and perception of negative attitudes measures to assess their independent associations with reporting a pro-science conflict position. We see that both measures are significantly associated with greater odds of a graduate student stating that the religion–science relationship is one of conflict and they are on the side of science. That is, regardless of whether a student thinks their discipline has a negative attitude toward religion, their strength of identification with science is positively associated with taking a pro-science conflict position. Similarly, regardless of a student's strength of identification with science, their perception that their discipline has a negative attitude toward religion is positively associated with taking a conflict position toward religion–science on the side of science. These findings provide further support for Hypothesis 1 and Hypothesis 2.

Hypothesis 3 states that our two focal predictors, strength of identification with science and perception that the discipline has negative attitudes toward religion, will interact with each. That is, students with stronger identification with science will be even more likely to report a pro-science conflict position if they believe that their discipline has a negative attitude toward religion. To assess this, we turn to Model 4, which includes an interaction term between the identification measure and the perception of discipline's attitude measure. Because of the inclusion of this interaction term, the ORs for each individual measure represent the OR when the other measure equals zero.

As seen in Model 4, the interaction term between identification and perception of negative attitudes is significant and is associated with an increase in the odds of a student reporting a pro-science conflict position ($OR = 1.27, p <$

.01). That is, the association of any one of the two individual measures with the odds of endorsing a pro-science conflict position becomes greater as the other increases. To show this more clearly, we computed predicted probabilities based on the results in this model and the observed range of values on the two measures. These predicted probabilities are shown in [table 4](#). We see in this table that a student with the highest value on the identification with science measure would have a 17% probability of reporting a pro-science conflict position if they strongly disagree that their discipline has a negative attitude toward science. Similarly, if a student strongly agrees that their discipline has a negative attitude toward religion but has a very weak identification with science, then their predicted probability of saying that religion and science are in conflict and they are on the side of science is 11%. However, if a student both strongly identifies with science *and* strongly agrees that their discipline has a negative attitude toward science, then this probability jumps to 51%. This provides support for Hypothesis 3.

Note that in the absence of higher values on the other predictor, [table 3](#) shows that each predictor appears to reduce the probability of a graduate student reporting a pro-science conflict position. That is, among those who strongly disagree that their discipline has a negative attitude toward religion, students with low identification with science actually have a higher probability of saying there is religion–science conflict and they are on the side of science than those students with high identification with science. Similarly, among those students with low identification with science, students who strongly disagree that their discipline has a negative attitude toward science have a higher probability of reporting a pro-science conflict position than those who strongly agree that their discipline has a negative attitude. So, while the predicted probabilities shown in [table 4](#)

TABLE 4 Predicted Probability of Science Graduate Students' Endorsement of Religion–Science Conflict on the Side of Science by Strength of Identification with Science and Perception of Negative Religion Attitudes in Discipline

	Strongly disagree: discipline has negative attitude towards religion (1)	Neutral on discipline has negative attitude towards religion (3)	Strongly agree: discipline has negative attitude towards religion (5)
Low scientist identification (1)	0.29 [0.12–0.45]	0.18 [0.11–0.25]	0.10 [0.02–0.18]
Medium scientist identification (3)	0.23 [0.17–0.29]	0.25 [0.22–0.29]	0.28 [0.22–0.34]
High scientist identification (5)	0.17 [0.09–0.25]	0.33 [0.28–0.38]	0.51 [0.41–0.61]

Note: Based on Model 4 in table 3 with other measures at their means; 95% confidence intervals are presented in brackets.

provide support to Hypothesis 3, they also show that support for Hypothesis 1 and 2 is more conditional in nature. That is, identification with science and perception of a negative attitude toward religion within a student's discipline do not by themselves inherently produce a positive association with reporting a pro-science conflict position. Rather, these associations depend on the status of the other.

DISCUSSION

In their review of research on the religion–science relationship, [Evans and Evans \(2008:100–01\)](#) made two primary suggestions for future studies. The first was for scholars to avoid the assumption that apparent or perceived conflict between religion and science is the result of different empirical claims about the world. Rather, they argued, we should be open to the possibility that apparent epistemological conflicts are actually social conflicts fueled by opposing values and identities, as well as struggles for cultural and institutional power (see also [Catto et al. 2019](#)). The second was for research to avoid the tendency of treating science and scientists in “static and monolithic terms” and to instead see them as “the words and actions of institutionally embedded persons.”

The study presented here is informed by both of [Evans and Evans' \(2008\)](#) suggestions as well as the recent literature review by [Catto et al. \(2019\)](#). The latter called for more research on social boundaries in order to “shed light on collective and moral identities in science-religion interactions” ([Catto et al. 2019:8](#)). Our study was guided by the proposition that expressions of religion–science conflict by scientists are often motivated by a desire to express their membership in a distinct social group (i.e., the scientific community) and to reflect the perceived values of that group. However, not all scientists are the same; they vary in their identification with science and in their perceptions of the culture of their scientific discipline.

Our analysis of data generated from a new survey of graduate students in five science disciplines found that students' perceptions of the religion–science relationship are influenced by the interaction between their own professional identity and perceptions of their profession's norms and culture. If a student strongly identifies with science *and* they also believe that their scientific discipline has a negative attitude toward religion, then they are more likely to endorse the idea that religion and science are in conflict with each other and to be on the side of science. We interpret this finding as the result of such students trying to express their commitment and solidarity with their scientific discipline. [Ecklund and Long \(2011:270\)](#) suggest that “it is possible that certain occupations are more likely to generate an identity that directs other aspects of one's life,” including perceptions of religion and spirituality. Being a scientist may become such a master identity for those who strongly identify with it and, combined with being in a discipline perceived to have a negative attitude toward religion, may shape graduate students' perceptions of there being a conflict between religion and science. On

the other hand, if a student does not strongly identify with science or they do not believe their discipline has a negative attitude toward religion, then they are much less likely to say that religion and science are in conflict and to be on the side of science. We argue this is because they are either not that invested in expressing such solidarity or they do not see such an expression as being the norm. Additionally, like previous work on the U.S. population and scientists (Ecklund and Park 2009; Scheitle and Ecklund 2017), this study found that the majority of graduate students view religion and science as being independent from or in collaboration with each other. Thus, this study adds to research dispelling the myth that most people hold a perception of religion and science as in conflict.

As with any study, there are limitations to this one. Although we utilized multiple items to measure some of our concepts (e.g., strength of identity as scientist), other concepts were based on a single item (e.g., perception of discipline's attitude toward religion). Ideally, we would have multiple items for all concepts. Moreover, the data are cross-sectional, which means that we cannot determine the causal order of effects. We argue that a student's perception of their discipline's attitude toward religion is influencing whether they report a pro-science conflict position. It is possible, though, that such students are projecting their view of conflict onto their discipline. That is, it is possible that the individual's perception of religion–science conflict is influencing their perception of their discipline's attitude toward religion. It is similarly possible that the relationship between individuals' strength of identity as a scientist and their perception of religion–science conflict could be reversed. Endorsing conflict with religion and being on the side of science, for instance, could strengthen one's sense of belonging to the scientific community. Subcultural Identity Theory of Religion shows how conflict with outsiders strengthens the collective identity of group members, which in turn reinforces group boundaries and perceptions of conflict with the outside world (Smith et al. 1998). It is thus likely that there is some reciprocal and dynamic causality between all of these variables. If we compare rates of holding a pro-science conflict position across disciplines between undergraduates (Scheitle 2011) and our sample, our sample has higher levels of a pro-science conflict position, which would be expected if graduate students are socialized into a pro-science conflict position (see table 2). Additionally, in bivariate regressions (results not shown), first year graduate students are significantly less likely to say their discipline has a negative attitude toward religion relative to all other years except 8 years and beyond, which just misses statistical significance. This is also what we would expect if graduate students come to view their discipline as having a negative attitude toward religion through socialization. These findings strengthen confidence in the causal specification of the models. Lastly, we do not have data on biblical literalism and conservative Protestantism among the respondents. This is unlikely to affect the results as scientists report low rates of both (Scheitle and Ecklund 2018).

Despite its limitations, this study offers an important step forward for research trying to understand how individuals perceive the religion–science relationship.

Much prior research has been descriptive in nature, with a focus on what proportion of the public takes a particular stance on the religion–science relationship. Little research has gone a step further to assess the mechanisms leading individuals to take one stance as opposed to another. It is tempting to see an individual's stance on the religion–science relationship as a primarily intellectual outcome. That is, individuals assess the empirical nature of the relationship and come to a conclusion based on that evidence. Differences in those conclusions, then, are the result of different pieces of evidence put into this assessment. Such an idea has a parallel in the idea that differences in attitudes toward scientific issues are a function of knowledge, which can be solved by reducing deficits in knowledge (Sturgis and Allum 2004). However, as with that deficit model, a purely rational interpretation of attitudes toward the religion–science relationship is likely incomplete (Catto et al. 2019; Simis et al. 2016).

This study built upon Baker's (2012) observation of differences in the social and demographic characteristics of individuals taking different stances on the religion–science relationship, which pointed to the social and cultural origins of those stances. In the context of graduate students in science, we argued that students' endorsement of the idea that religion and science are in conflict would be shaped by the interaction between their investment in an identity as a scientist *and* their perception that their discipline views religion negatively. If a student both strongly connects their identity to being a scientist and thinks that their discipline views religion negatively, then the idea that religion and science are in conflict and one is on the side of science is an expression of the student's sense of membership in the scientific community.

Future research could explore these dynamics among other groups. For instance, how does an individual's strength of religious identity and their perception of their religious peers' views of science influence their endorsement of a pro-religion conflict stance on the religion–science relationship? Also, while this study was correlational in nature, future research could consider experimental designs in which subjects are exposed to varying statements about how others in a peer group view the religion–science relationship to assess how these treatments influence the subjects' own stance on that relationship, either alone or in interaction with their strength of connection to that group. Such studies would continue to advance a sociological analysis of how the public views the religion–science relationship.

Finally, this study could have some practical applications for those looking to engage the scientific community in conversations about religion or the religion–science relationship. Our findings show that a scientist's perception of their peers' attitudes toward religion is an influence on their own attitudes about the religion–science relationship. This suggests that addressing those perceptions of peers' attitudes could be an important area in which to work. That is, if scientists can be shown that most of their peers are actually not hostile toward religion and largely do not see religion as being in conflict with science, then this could ease any felt professional or social pressure to endorse such positions themselves.

SUPPLEMENTARY MATERIAL

Supplementary data analysis is available at *Sociology of Religion* online.

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