Secularism in science: The role of religious affiliation in assessments of scientists’ trustworthiness

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Abstract

With controversies surrounding numerous science topics, including vaccinations and climate change, science skepticism in the United States is of growing concern. Some skepticism of science may stem from the perceived association between science and atheism, as well as stereotypes of religious individuals as prosocial. Three studies examine how scientists’ religious affiliation (or lack thereof) influences perceptions of their warmth and trustworthiness among Christian participants. (Study 1 also includes atheist participants for comparison purposes.) Whereas atheist participants evaluate atheist scientists as more trustworthy than scientists from various religious groups (e.g., Christian, Jewish, Muslim), Christian participants consistently evaluate atheist scientists as less trustworthy and less warm than religious scientists, and not exclusively Christian scientists. These effects are explained in part by Christian participants’ perceptions that atheist scientists are less motivated by prosociality compared to religiously-affiliated scientists and, as Study 3 demonstrates, have a negative association with trust in scientists in general.
Among the American public, attitudes toward science and scientists are somewhat mixed. Despite Americans’ trust in science having remained relatively stable since the 1970s, only 40% of Americans report having “a great deal of confidence” in the scientific community (Smith et al., 2016). Moreover, although the percentage of American adults who say they have “a great deal of confidence” in scientists to act in the best interests of the public (21%) is higher than for most other institutional groups besides the military (33%), this proportion is still objectively low (Pew Research Center, 2017).

One consistent predictor of negative attitudes toward science in the U.S. is religiosity. Frequent church attendance correlates with greater distrust in science even after controlling for political conservatism, socioeconomic status, and scientific knowledge (Gauchat, 2011, 2012). Additionally, Biblical literalism (i.e., interpreting the Bible as the literal word of God) among Protestants is associated with greater opposition to scientists’ involvement in debates about moral issues such as embryonic stem-cell research (Evans, 2013). Why do religious believers tend to distrust science, and how can their distrust be mitigated? Given that over two-thirds of Americans self-identify as “highly religious” or “moderately religious” (Gallup, 2017), as well as the potential detrimental effects of distrust in science (e.g., environmental hazards, reduced openness to health information; Chigwedere, et al., 2008; McCright and Dunlap, 2013), investigating these questions is critical.

Recent research suggests religious believers’ science distrust is due in part to a perceived conflict between scientific principles and religious traditions (Gauchat, 2011, 2015). For example, people exposed to strong [weak] scientific arguments subsequently exhibit more negative [positive] attitudes toward God; thus, science and religion are viewed as competing for explanatory power (Preston and Epley, 2009). The science-religion conflict perception may be exacerbated by the fact that, relative to the general American population, scientists are disproportionately secular. Whereas about 8 in 10 Americans report that they believe in God (Gallup, 2016), only 25% of scientists at elite U.S. universities (Ecklund and Scheitle, 2007) and 7% of members of the National Academy of Sciences (Larson and Witham, 1998) say the same.

In light of the perceived and objective secularity of scientists, it is little wonder that stereotypes of scientists and stereotypes of atheists – one of the most distrusted and stigmatized groups in American society (Gervais et al., 2011) – overlap considerably. Despite scientists being considered highly competent, they are also consistently evaluated as robot-like and amoral (Fiske and Dupree, 2014; Rutjens and Heine, 2016). Scientists are stereotyped as focused on pursuit, regardless of whether it results in immoral conduct (Rutjens and Heine, 2016). Similarly, people rate atheists (relative to religious believers) as being more likely to commit immoral actions (Brown-Iannuzzi et al., 2017). Additionally, like scientists, atheists tend to be stereotyped as more competent than warm (Rios et al., 2015).

If perceptions of science as secular contribute to religious believers’ distrust of science and scientists, then cues as to a scientist’s religious identity (or lack thereof) may influence trust in that scientist, and perhaps trust in science as a whole. Specifically, religious believers may see religious scientists as more trustworthy than non-religious
scientists. Indirectly supporting this possibility, Christian participants in one set of studies exhibited more trust in targets who wore (vs. did not wear) religious badges associated with Christianity (e.g., a cross necklace). Although non-Christian participants also showed the effect, it was somewhat weaker than for Christian participants (McCullough et al., 2016). In another experiment, a sample of mostly Christian participants who read a description of Francis Collins (director of the National Institutes of Health and a self-identified Christian) subsequently rated science and religion as more compatible than did those who read a description of Richard Dawkins (an evolutionary biologist and outspoken Atheist; Scheitle and Ecklund, 2017). Notably, however, perceptions of Collins’ and Dawkins’ trustworthiness were not assessed in this study, nor was it clear whether the results would generalize to scientist exemplars who are less well-known or whose beliefs are less extreme.

Why would religious scientists evoke greater perceptions of trustworthiness than non-religious scientists among believers? One potential explanation involves ingroup bias, or the general tendency to view one’s own group more favorably than other groups (Tajfel and Turner, 1986). We argue, though, due to the link between science and secularity, a scientist who possesses any religious affiliation (even if not matching the perceiver’s religious affiliation) will be rated as more trustworthy than a non-religious scientist. If this is the case – for instance, if Christian perceivers trust a scientist who self-identifies as Muslim or Jewish as much as a scientist who self-identifies as Christian – ingroup bias alone would not explain the phenomenon, as both Muslim and Jewish scientists would be outgroup members in relation to Christians. If, on the other hand, Christian perceivers trust scientists who self-identify as Christian more than they trust all non-Christian scientists (regardless of specific religious or non-religious affiliation), this would corroborate an ingroup bias account.

Rather than simply being a product of ingroup bias, we propose believers’ greater trust in religious (relative to non-religious) scientists stems from the assumed association of religion with prosocial motives. That is, believers may assume religious scientists are more motivated than non-religious scientists to help humanity. Indeed, religious believers are stereotyped as more prosocial than non-believers (Saroglou et al., 2011). Because scientists are already seen as highly competent, even if viewed as amoral and untrustworthy (Fiske and Dupree, 2014; Rutjens and Heine, 2016), believers’ trust in religious scientists should be uniquely predicted by the scientists’ presumed prosocial motives, and not their presumed competence-related motives (e.g., intellectual curiosity, self-interest). Initial evidence suggests this may be the case, as the perceived prosocial motives of scientists explain levels of trust in said scientists more than perceived self-interest motives or perceived competence (Critchley, 2008).

In the present studies, we examined whether and why Christian participants would trust a religious scientist more than an atheist scientist. We focused on Christian participants, as they are the religious majority in the United States (Gallup, 2016). Across all studies, Christian participants (and atheist participants in Study 1, included for comparison purposes) read about a scientist who self-identified as Christian (Studies 1-3), atheist (Studies 1-3), Jewish (Study 1), Muslim (Study 2), or whose religious affiliation was not specified (Study 3). Participants then indicated the extent they perceived the
scientist as possessing various traits (i.e., trustworthiness, warmth, and competence) and motives (i.e., prosociality, self-interest, and intellectual curiosity). Additionally, participants in Study 3 completed a measure of their trust in scientists in general. We predicted Christian participants would rate scientists of any religious affiliation as more trustworthy than non-religious scientists, and these effects would be due to perceptions of religious scientists as being more prosocially motivated. Further, in Study 3 we explored whether trustworthiness of the religious scientist would be associated with trust in science.

Study 1

Method

Participants.

Five hundred and sixty-nine workers on Amazon’s Mechanical Turk (mTurk) database (54.3% female, $M_{age} = 36.48$, $SD = 11.53$, 75% White/European American, 54.5% had earned a bachelor’s degree or higher) participated in exchange for $0.25. However, we decided a priori to only analyze data from Christian ($n = 276$) and atheist ($n = 96$) participants, for whom one scientist would be an ingroup member. The number of Jewish participants in our sample ($n = 14$) was too small for analysis, and participants of other religious affiliations (e.g., Muslim, Buddhist, agnostic, none) would not have considered any of the scientists to be ingroup members.

Procedure and Materials.

Participants first completed a basic demographic survey, including questions about their gender and religious affiliation. They were then randomly assigned to read one of six short vignettes about a scientist. The scientist’s gender was always matched to the gender of the participant. The scientist in the vignette, Dr. [Steven/Abigail] Kanterman, was described as a molecular biologist at an Ivy League university who recently received two scientific awards. Critically, the vignette ended with “Dr. Kanterman is also an outspoken member of the [Christian/Jewish/atheist] community, who regularly attends [church services/synagogue/conferences on atheism] and oversees a popular online discussion forum about [religion/religion/atheism].” For detailed information on all procedures and materials, see the supplementary file information.

After reading their assigned vignette, participants used a 7-point scale taken from previous research (Leach et al., 2007) with “strongly disagree” and “strongly agree” as anchors to indicate whether they thought the scientist possessed three traits related to trustworthiness (honest, trustworthy, sincere; $M = 5.36$, $SD = 1.21$, $\alpha = .90$), three warmth-related traits (likeable, warm, friendly; $M = 5.06$, $SD = 1.24$, $\alpha = .90$), and three competence-related traits (intelligent, skilled, competent; $M = 6.11$, $SD = 1.00$, $\alpha = .86$).

Lastly, before debriefing, participants completed an 18-item measure of their perceptions of the scientist’s motives (Critchley, 2008) on a scale from 1 (strongly
disagree) to 9 (strongly agree). This measure consists of three 6-item subscales: prosociality motives (e.g., “Wants to contribute towards the understanding of our world”; \( M = 6.84, SD = 1.64, \alpha = .90 \)), self-interest motives (e.g., “Wants to be famous and well-known”; \( M = 5.31, SD = 1.55, \alpha = .77 \)), and intellectual curiosity motives (e.g., “Is naturally curious about their work”; \( M = 7.48, SD = 1.61, \alpha = .91 \)).

Results

As noted above, we analyzed only data from Christian and atheist participants. Specifically, we conducted a 2 (participant religious affiliation: Christian vs. atheist) x 3 (scientist religious affiliation: Christian vs. Jewish vs. atheist) between-participants analysis of variance on each dependent measure (the trait subscales), and each potential mediator (the motive subscales). Participant gender did not significantly interact with participant religious affiliation and scientist religious affiliation on any measures in Study 1, and demonstrated non-replicated interactions in Study 2 and Study 3. Across all studies, participant ethnicity did not moderate any of the results.

Trait subscales.

For trustworthiness, there were no main effects of participant religious affiliation, \( F(2, 366) = .91, p = .340, \eta^2_p = .002 \), or scientist religious affiliation, \( F(2, 366) = .25, p = .778, \eta^2_p = .001 \). As predicted, however, a significant interaction between participant religious affiliation and scientist religious affiliation emerged, \( F(2, 366) = 11.40, p < .001, \eta^2_p = .059 \). Planned pairwise comparisons revealed Christian participants trusted the atheist scientist, 95% CI [4.76, 5.22], significantly less than the Christian scientist, 95% CI [5.26, 5.76], \( p = .003 \), and the Jewish scientist, 95% CI [5.43, 5.92], \( p < .001 \) (See Figure 1). No difference was found between Christian participants’ trustworthiness ratings of the Christian and Jewish scientists \((p = .352)\). By contrast, atheist participants rated the Atheist scientist, 95% CI [5.39, 6.15], as significantly more trustworthy than the Christian scientist 95% CI [4.58, 5.44], \( p = .010 \), and the Jewish scientist, 95% CI [4.58, 5.42], \( p = .008 \). Atheist participants did not rate the Jewish and Christian scientists as significantly different on trustworthiness \((p = .970)\).

Table 1.

Means, Standard Errors for Trait Subscales and Trustworthiness Significant Differences in Studies 1-3
| Study     | Participant Affiliation | Competence | Warmth | Trust | Significant Differences in Trust |
|-----------|-------------------------|------------|--------|-------|----------------------------------|
|           |                         | Mean (SE)  | Mean (SE) | Mean (SE) | Scientist Affiliation |
|           |                         |            |          |       | A | C | Other |
| Study 1   | Atheist                 | 6.28 (0.17)| 5.36 (0.19) | 5.77 (0.19) | - | X | X |
|           | Christian               | 5.91 (0.19)| 4.86 (0.22) | 5.01 (0.22) | - | - | O |
|           | Jewish                  | 6.02 (0.18)| 4.81 (0.21) | 5.00 (0.21) | - | - | - |
|           |                         | 6.11 (0.10)| 4.41 (0.12) | 4.99 (0.12) | - | X | X |
|           |                         | 6.06 (0.11)| 5.43 (0.13) | 5.51 (0.13) | - | - | O |
|           |                         | 6.18 (0.10)| 5.48 (0.12) | 5.67 (0.12) | - | - | - |
| Study 2   | Christian               | 5.61 (0.11)| 4.53 (0.11) | 4.87 (0.11) | - | X | X |
|           | Christian               | 6.18 (0.12)| 5.44 (0.11) | 5.71 (0.11) | - | - | X |
|           | Muslim                  | 5.92 (0.11)| 5.13 (0.11) | 5.30 (0.11) | - | - | - |
| Study 3   | Christian               | 5.98 (0.96)| 4.39 (0.13) | 4.97 (0.12) | - | X | O |
|           | Christian               | 6.33 (0.65)| 5.28 (0.13) | 5.42 (0.13) | - | - | X |
|           | Religion Unspecified    | 6.19 (1.16)| 4.69 (0.13) | 5.07 (0.13) | - | - | - |

'X' indicates significant differences were present between the two religious affiliations.
'O' indicates no significant differences were found.

**Figure 1.** Scientist trustworthiness evaluations by religious affiliation of the scientist (Studies 1-3) and participant religious affiliation (Study 1).
On warmth, there were no main effects of participant religious affiliation, $F(2, 366) = .45, p = .505, \eta^2_p = .001$, or scientist religious affiliation, $F(2, 366) = 1.65, p = .193, \eta^2_p = .009$. However, there was a significant two-way interaction, $F(2, 366) = 15.210, p < .001, \eta^2_p = .077$. Planned pairwise comparisons revealed Christian participants rated the atheist scientist, 95% CI [4.18, 4.64], as significantly less warm than the Christian scientist 95% CI [5.18, 5.67], $p < .001$, and the Jewish scientist, 95% CI [5.23, 5.72], $p < .001$ (See Figure 2). Christian participants’ warmth ratings of the Christian and Jewish scientists did not differ ($p = .774$). Furthermore, atheist participants’ warmth ratings did not significantly differ for any of the scientists ($ps > .055$).

| Study | Participant Affiliation |
|-------|------------------------|
|       | Atheist                |
| Study 1 | Christian           |
| Study 2 | Christian           |
| Study 3 | Christian           |

**Figure 2. Scientist warmth evaluations by religious affiliation of the scientist (Studies 1-3) and participant religious affiliation (Study 1).**

On competence, there were no main effects, nor a significant two-way interaction ($ps > .347$) (See Figure 3).
Figure 3. Scientist competence evaluations by religious affiliation of the scientist (Studies 1-3) and participant religious affiliation (Study 1).

Motive subscales.

On prosociality motives, there was neither a main effect of participant religious affiliation, $F(2, 366) = .11, p = .736, \eta^2_p = .003$, nor scientist religious affiliation, $F(2, 366) = .76, p = .469, \eta^2_p = .004$; but a significant predicted two-way interaction, $F(2, 366) = 5.12, p = .006, \eta^2_p = .03$. Planned pairwise comparisons indicated Christian participants rated the atheist scientist ($M = 6.59, SE = 16, 95\% CI [6.27, 6.91]$) as less motivated by prosociality than the Christian scientist ($M = 7.10, SE = .18, 95\% CI [6.75, 7.44]), $p = .035$. Christian participants’ ratings of the Jewish scientist ($M = 6.88, SE = .17, 95\% CI [6.54, 7.22]$) did not differ from either the atheist scientist ($p = .228$) or Christian scientist ($p = .376$). Conversely, atheist participants rated the atheist scientist ($M = 7.37, SE = .27, 95\% CI [6.84, 7.89]$) as more motivated by prosociality than the Christian scientist ($M = 6.48, SE = .30, 95\% CI [5.89, 7.08]), $p = .030$, or Jewish scientist ($M = 6.52, SE = .30, 95\% CI [5.94, 7.11]), $p = .036$. Atheist participants’ ratings of the Christian and Jewish scientists did not differ ($p = .926$).

On self-interest motives, there was a main effect of participant religious affiliation, $F(2, 366) = 4.36, p = .037, \eta^2_p = .012$. Christian participants ($M = 5.39, SE = .09, 95\% CI [5.21, 5.57]$) rated the scientist as more motivated by self-interest than did atheist participants ($M = 5.02, SE = .15, 95\% CI [4.71, 5.32]$). There was also a main effect of scientist religious affiliation, $F(2, 366) = 4.08, p = .018, \eta^2_p = .022$, with the atheist scientist ($M = 5.55, SE = .14, 95\% CI [5.26, 5.83]$) rated higher in self-interest
motives than the Christian scientist \( (M = 5.07, SE = .16, 95\% CI [4.76, 5.39]) \) and the Jewish scientist \( (M = 4.99, SE = .16, 95\% CI [4.68, 5.30]) \). However, the two-way interaction was only marginal, \( F(2, 366) = 2.47, p = .086, \eta^2_p = .013 \). The interaction’s pattern suggested Christian participants rated the atheist scientist as more motivated by self-interest than the Christian or Jewish scientist, whereas atheist participants did not differ in their ratings.

On intellectual curiosity motives, there were no main effects, nor a two-way interaction \( (ps > .194) \).

**Mediation analyses.**

By conducting a mediation analysis, we can assess whether the relationship between scientists’ religious affiliation and trustworthiness can be explained in part by a third variable (perceived prosociality motives). In other words, we can assess whether scientists’ religious affiliation influences perceptions of their prosociality motives, which in turn impact trustworthiness (see Figure 4). By doing so, we clarify the nature of the relationship between these three variables and provide evidence that prosociality motives drive participants’ evaluations of the trustworthiness of scientists from different religious backgrounds. To this end, we conducted a moderated mediation analysis, using PROCESS model 8 with 10,000 bootstrapping estimates (Hayes, 2013), with scientist religious affiliation as the independent variable, prosociality motives as the mediator, participant religious affiliation as the moderator (due to the divergent patterns of results on trustworthiness for Christian and atheist participants), and trustworthiness as the dependent variable. We ran planned contrasts to compare the effects within the atheist scientist condition to the effects within the Christian and Jewish scientist conditions.

The overall indirect effect was significant \( (b = .42, SE = .16, 95\% CI [.14, .75]) \), as were the indirect effects of scientist religious affiliation among both Christian participants \( (b = .13, SE = .07, 95\% CI [.004, .29]) \) and atheist participants \( (b = -.29, SE = .13, 95\% CI [-.55, -.04]) \). The overall indirect effect of the contrast comparing the Christian and Jewish scientist conditions to each other was nonsignificant, as expected \( (b = -.09, SE = .16, 95\% CI [-.41, .22]) \). Thus, scientist religious affiliation influenced perceptions of their prosociality motives and hence evaluations of their trustworthiness.

A similar moderated mediation analysis with warmth instead of trustworthiness ratings as the dependent variable also revealed a significant overall indirect effect \( (b = .33, SE = .12, 95\% CI [.11, .60]) \), as well as indirect effects of scientist religious affiliation among both Christian participants \( (b = .10, SE = .06, 95\% CI [.002, .23]) \) and atheist participants \( (b = -.23, SE = .10, 95\% CI [-.44, -.04]) \). The overall indirect effect of the contrast comparing the Christian and Jewish scientist conditions to each other was nonsignificant \( (b = -.07, SE = .13, 95\% CI [-.33, .17]) \), thereby demonstrating a similar pattern of results to the trustworthiness moderated mediation analysis.

We did not conduct analyses with self-interest or intellectual curiosity motives as mediators, or with competence ratings as the dependent variable, because the interaction effects on these measures were non-significant.
Discussion

The results of Study 1 demonstrated Christian participants rated atheist scientists as lower on trustworthiness and warmth than both Christian and Jewish scientists, whereas atheist participants rated atheist scientists as higher on trustworthiness and warmth than both Christian and Jewish scientists. Further, these effects were mediated by Christian and atheist participants’ tendencies to ascribe fewer [more] prosocial motives to the atheist relative to other scientists. Although atheists demonstrated an ingroup bias in that they considered atheist scientists more trustworthy and warmer than scientists from any outgroup (Christian or Jewish), Christian participants rated scientists from a religious outgroup (i.e., Jewish) no differently from how they rated scientists from their religious ingroup (i.e., Christian). Thus, Christians’ distrust of atheist scientists is not simply a byproduct of atheists’ status as an outgroup.

Study 2

The primary objective of Study 2 was to replicate Study 1 results using scientists from a different religious outgroup (Muslim instead of Jewish). As Muslims are among the most negatively stereotyped groups in Western society (Imhoff and Recker, 2012), demonstrating that Christian participants trust (and attribute prosociality motives to) both Christian and Muslim scientists to a greater extent than atheist scientists would be an especially strong test of our hypotheses. A secondary objective of Study 2 was to ensure results generalize to different types of scientists: production scientists (i.e., who are focused on using science to produce materials) and impact scientists (i.e., who are focused on using science to impact society) (McCright and Dunlap, 2013).

Method

Participants.

Two hundred and ninety mTurk workers (49.7% female, $M_{age} = 36.47$, $SD = 12.26$, 73.1% White/European American, 58.3% had a bachelor’s degree or higher) participated in exchange for $0.25. To be eligible for the study, potential participants had
to be U.S. citizens and self-identify with a Christian denomination (n = 125 Christian-Catholic, n = 111 Christian-Protestant, n = 54 Christian-Other).

Procedure and Materials.

The procedure was similar to Study 1, with additional measures and two critical modifications. First, the last sentence of the Jewish scientist vignette was modified to a vignette describing a Muslim scientist: “Dr. Kanterman is also an outspoken member of the Muslim community, who regularly attends mosque and oversees a popular online discussion forum about religion.” Second, instead of describing a molecular biologist, the scientist was described as either conducting research on the health risks of housing materials (i.e., an impact scientist) or conducting research on the production of housing materials (i.e., a production scientist). Participants completed the same trait ratings (trustworthiness: M = 5.28, SD = 1.13, α = .86; warmth: M = 5.01, SD = 1.14, α = .89; competence: M = 5.89, SD = 1.11, α = .91) and motive ratings (prosociality: M = 7.03, SD = 1.46, α = .92; intellectual curiosity: M = 7.44, SD = 1.38, α = .93; self-interest: M = 5.70, SD = 1.62, α = .88) as in Study 1. Study 2 included several additional post-manipulation measures including assessments of the perceived threat of science (adapted from Simpson, et al., 2017), and science-religion compatibility (Simpson and Rios, 2019). These measures were included as covariates, but did not alter the reported results and thus were not included in the final analyses. Other measures also examined perceived liberal bias of science and scientific knowledge (National Science Foundation, 2001). However, as these items were exploratory in nature they will not be discussed further. Lastly, Study 2 measured reported willingness to provide either government or personal support for science as potential outcome variables. However, despite exhibiting a similar pattern of results, these two measures were more general than scientist trustworthiness and therefore are beyond the scope of this paper.

Results

To test whether participants (all Christian) trust and attribute greater prosociality motives to the Christian and Muslim relative to atheist scientist, we conducted one-way analyses of variance on each trait and motive composite. Science type (impact vs. production) did not interact with scientist religious affiliation on any measure and thus will not be discussed further. Participant gender did interact significantly with scientist religious affiliation on self-interest motives, \( F(2, 284) = 3.67, p = .027, \eta^2_p = .03 \), with female participants attributing less self-interest to the Christian (vs. Muslim or atheist) scientist, whereas male participants did not differ in self-interest attributions. However, this interaction was not anticipated, nor was it replicated in any of the other studies. Participant ethnicity did not interact with religious affiliation on any variable of interest.

Trait subscales.

On trustworthiness, the omnibus ANOVA was significant, \( F(2, 287) = 14.57, p < .001, \eta^2_p = .09 \). Planned pairwise comparisons indicated participants rated the atheist scientist, 95% CI [4.65, 5.08], as significantly less trustworthy than both the Christian scientist, 95% CI [5.49, 5.93], \( p < .001 \), and the Muslim scientist, 95% CI [5.09, 5.52], \( p \)}
Furthermore, participants rated the Muslim scientist as significantly less trustworthy than the Christian scientist, \( p = .010 \). The warmth omnibus ANOVA was also significant, \( F(2, 287) = 18.06, p < .001, \eta^2_p = .11 \). Planned pairwise comparisons revealed the same pattern as trustworthiness: Participants rated the atheist scientist, 95% CI [4.31, 4.74], as significantly less warm than both the Christian scientist, 95% CI [5.22, 5.66], \( p < .001 \), and the Muslim scientist, 95% CI [4.91, 5.34], \( p < .001 \) (See Figure 2). Moreover, participants rated the Muslim scientist as significantly less warm than the Christian scientist, \( p = .045 \).

Unlike in Study 1, the omnibus ANOVA on competence was also significant, \( F(2, 287) = 6.55, p = .002, \eta^2_p = .04 \). Planned pairwise comparisons revealed participants rated the atheist scientist, 95% CI [5.39, 5.82], as significantly less competent than both the Christian scientist, 95% CI [5.95, 6.40], \( p < .001 \), and the Muslim scientist, 95% CI [5.70, 6.13], \( p = .046 \) (See Figure 3). However, participants’ ratings of the Christian and Muslim scientists did not differ, \( p = .100 \).

Motive subscales.

On prosociality motives, the omnibus ANOVA was significant, \( F(2, 287) = 7.39, p = .001, \eta^2_p = .05 \). As predicted, participants were attributed lower prosociality motives to the atheist scientist (\( M = 6.61, SE = .14, 95\% CI [6.33, 6.89] \)) than both the Christian scientist (\( M = 7.39, SE = .15, 95\% CI [7.10, 7.69] \)), \( p < .001 \), and the Muslim scientist (\( M = 7.13, SE = .14, 95\% CI [6.84, 7.41] \)), \( p = .012 \). Participants’ attributions of prosociality motives to the Christian and Muslim scientists did not differ, \( p = .201 \).

Unexpectedly, the omnibus ANOVA was also significant on self-interest motives, \( F(2, 287) = 6.40, p = .002, \eta^2_p = .043 \). However, the pattern was somewhat different: Participants were less likely to attribute self-interest motives to the Christian scientist (\( M = 5.20, SE = .17, 95\% CI [4.87, 5.53] \)) than to the atheist scientist (\( M = 5.94, SE = .16, 95\% CI [5.63, 6.26] \)), \( p = .001 \), and to the Muslim scientist (\( M = 5.90, SE = .16, 95\% CI [5.59, 6.22] \)), \( p = .003 \). Attributions of self-interest motives to the atheist and Muslim scientists did not differ, \( p = .859 \).

The omnibus ANOVA on intellectual curiosity motives was marginally significant, \( F(2, 287) = 2.51, p = .083, \eta^2_p = .02 \), with the pattern suggesting participants were less likely to attribute such motives to the atheist scientist than to the Christian and Muslim scientists (who did not differ from one another).

Mediation analyses.

As in Study 1, prosociality motives were examined as a mediator of the tendency to view the atheist scientist as less trustworthy than the Christian and Muslim scientists. Unlike Study 1, this sample was limited to Christian participants. Thus, we conducted a mediation analysis (See Figure 4) without participant religious affiliation as a moderator, using PROCESS model 4 with 10,000 bootstrapping estimates (Hayes, 2013). Scientist religious affiliation was entered as the independent variable, with a contrast comparing
the atheist condition to the Christian and Muslim conditions. Prosociality motives were entered as the mediator to again determine if prosociality explain the relationship between scientist religious affiliation and trustworthiness. Trustworthiness ratings were entered as the dependent variable. The overall indirect effect was significant ($b = .28, SE = .08, 95\% \text{ CI} [.12, .45]$). However, the overall indirect effect of the contrast comparing the Christian and Muslim scientist conditions to each other, as predicted, was nonsignificant ($b = .11, SE = .08, 95\% \text{ CI} [-.05, .28]$). In other words, similar to Study 1, Christian scientists (relative to atheist scientists) were perceived to have more prosocial motives, which in turn predicted evaluations of their trustworthiness.

Because warmth and competence ratings were also significantly affected by scientist religious affiliation in this study, we conducted identical mediation analyses with these ratings as dependent variables. In both analyses, the overall indirect effect comparing the atheist condition to the Christian and Muslim conditions was significant (warmth: $b = .23, SE = .07, 95\% \text{ CI} [.10, .38]$; competence: $b = .31, SE = .09, 95\% \text{ CI} [.13, .50]$), but the overall indirect effect comparing the Christian and Muslim conditions was not (warmth: $b = .09, SE = .07, 95\% \text{ CI} [-.04, .23]$; competence: $b = .13, SE = .09, 95\% \text{ CI} [-.05, .30]$).

Discussion

Study 2 built upon Study 1 by demonstrating Christian participants rate atheist scientists as less trustworthy and less prosocially motivated than not only Christian and Jewish scientists, but also Muslim scientists. This finding is notable given Muslims are an especially stigmatized religious outgroup (Imhoff and Recker, 2012), suggesting scientists from some stigmatized groups (atheists) are distrusted more than others (Muslims). The negative stereotypes about Muslims in Western societies may also explain why Christians reported less trust in a Muslim than Christian scientist, unlike the pattern observed with Jewish scientists in Study 1. Thus, religious believers are not considered a homogeneous ingroup by Christians. In addition to trustworthiness, participants rated atheist scientists as less warm and competent than Christian and Muslim scientists; and the effect of scientist religious affiliation on each trait ratings was mediated by participants’ reduced attributions of prosociality motives to the atheist (vs. Christian or Muslim) scientist. Although we did not anticipate scientist religious affiliation would influence competence ratings, one possible explanation is trustworthiness ratings spilled over to affect other trait ratings. Indeed, traits related to morality – such as trustworthiness – are considered fundamental to judgments of people and groups (Brambilla et al., 2012). We did not find any effects on competence in Study 1 however, so we interpreted this finding with caution until we determined whether it replicated in Study 3.

Study 2 also showed the effects of scientist religious affiliation on trait ratings and attributions of prosociality hold for different scientist types. In other words, the effects did not depend on whether the scientist was described as doing research to benefit society (i.e., impact science) or doing research to produce new materials (i.e., production science).
Study 3

The primary objectives of Study 3 were threefold. First, for exploratory purposes, we sought to compare Christian participants’ perceptions of a scientist with no specified religious affiliation to perceptions of a Christian or atheist scientist. On one hand, participants may engage in social projection (i.e., assume the scientist shares their religious affiliation; Robbins and Krueger, 2005) and hence rate the religion-unspecified scientist similarly to the Christian scientist. On the other hand, if participants’ default assumption is scientists are secular (Rutjens and Heine, 2016), they may rate the religion-unspecified scientist similarly to the atheist scientist. We had no a priori predictions as to which possibility was more likely. Second, we sought to replicate the results of Studies 1 and 2 using a different population (college students instead of mTurk workers). Third, we sought to determine whether participants’ greater trust in the Christian (relative to atheist) scientist would be associated with their trust in science as a whole.

Method

Participants.

Data were collected from three hundred and thirty-four students at a Midwestern university (70.4% female, M̅age = 19.06, SD = 2.58; 86.8% White/European American, 53.7% had at least a bachelor’s degree). However, because there were not enough atheists in the sample (n = 21) to analyze, and both the Christian and atheist scientists were outgroup members for participants of all other religious affiliations (e.g., Muslim, Jewish, Buddhist, agnostic; n = 94), we decided a priori to only analyze data from Christian participants (n = 219). Of the 219 Christian participants, 36 identified as Protestant, 95 identified as Catholic, and 88 identified as another Christian denomination.

Procedure and Materials.

The procedure was identical to Study 1, with two modifications. First, the Jewish scientist vignette was replaced by a vignette where the scientist’s religious affiliation was not specified. Specifically, the vignette’s final sentence (i.e., about the scientist’s participation in religious services and practices) was omitted. Second, at the end of the study, participants completed a measure of their trust in 12 different types of scientists (e.g., industrial chemists who create stronger synthetic construction materials, climate scientists who measure greenhouse gas pollution) using a 5-point scale (M̅ = 3.77, SD = .58; α = .85). This measure from McCright and Dunlap (2013) was included to assess trust in scientists more generally – in other words, not just the scientist described in the vignette.

The trait measures (trustworthiness: M̅ = 5.15, SD = 1.09, α = .86; warmth: M̅ = 4.77, SD = 1.18, α = .91; competence: M̅ = 6.16, SD = .96, α = .83) and motive measures (prosociality: M̅ = 6.99, SD = 1.43, α = .93; self-interest: M̅ = 5.95, SD = 1.43, α = .85; intellectual curiosity: M̅ = 7.58, SD = 1.27, α = .93) remained the same as in Studies 1 and 2.
Results

As noted above, we analyzed only the data from Christian participants. Participant ethnicity and gender did not interact with scientist religious affiliation to affect any of the dependent measures, except for an interaction of gender and religious affiliation on prosociality motives, $F(2, 210) = 3.50, p = .032, \eta^2_p = .03$. The pattern of this interaction suggested the tendency to attribute weaker prosociality motives to the atheist (relative to Christian and religion-unspecified) scientist was more pronounced among male than female participants. However, this interaction was unanticipated and did not emerge in any other study, so participant gender will not be discussed further.

Trait subscales.

A between-participants ANOVA revealed a significant effect on trustworthiness ratings, $F(2, 216) = 3.59, p = .029, \eta^2_p = .03$. According to planned contrasts, participants trusted the atheist scientist, 95% CI [4.72, 5.21], significantly less than the Christian scientist, 95% CI [5.17, 5.68], $p = .011$ (See Figure 1). Participants’ trustworthiness ratings of the atheist and religion-unspecified scientist, 95% CI [4.82, 5.32], did not differ, $p = .558$. Furthermore, participants trusted the religion-unspecified scientist less than the Christian scientist, $p = .050$.

The omnibus ANOVA on warmth ratings was also significant, $F(2, 216) = 11.68, p < .001, \eta^2_p = .10$. Planned pairwise comparisons revealed participants rated the atheist scientist, 95% CI [4.13, 4.64], as less warm than the Christian scientist, 95% CI [5.01, 5.54], $p < .001$, and marginally less warm than the religion-unspecified scientist, 95% CI [4.44, 4.95], $p = .096$ (See Figure 2). Further, participants rated the Christian scientist as significantly warmer than the religion-unspecified scientist, $p = .002$.

The omnibus ANOVA on competence ratings was marginally significant, $F(2, 216) = 2.44, p = .090, \eta^2_p = .02$, with a similar but weaker pattern of means (See Figure 3).

Motive subscales.

The omnibus ANOVA on prosociality motives was significant, $F(2, 213) = 5.23, p = .006, \eta^2_p = .05$. Planned pairwise comparisons indicated participants attributed lower prosociality motives to the atheist scientist ($M = 6.57, SE = .16, 95\% CI [6.25, 6.90]$) than to the Christian scientist ($M = 7.30, SE = .17, 95\% CI [6.97, 7.64]$), $p = .002$, or religion-unspecified scientist ($M = 7.11, SE = .17, 95\% CI [6.78, 7.43]$), $p = .023$. Participants’ prosociality attributions for the Christian and religion-unspecified scientists did not differ, $p = .400$.

The omnibus ANOVA on self-interest motives was marginally significant, $F(2, 213) = 2.68, p = .071, \eta^2_p = .03$, with the pattern of means suggesting participants were less likely to attribute self-interest motives to the Christian (relative to atheist or religion-unspecified) scientist.
The omnibus ANOVA on intellectual curiosity motives did not reach significance, $F(2, 213) = 2.04, p = .133, \eta^2_p = .02$.

**Trust in science.**

The omnibus ANOVA on this measure was not significant, $F(2, 216) = 1.04, p = .354, \eta^2_p = .01$. However, given trustworthiness ratings of the scientist in the vignette correlated with trust in science more generally ($r = .25, p < .001$), we proceeded to test for indirect effects on trust in science via trustworthiness ratings, as detailed below.

**Mediation analyses.**

First, we tested whether prosociality motives would mediate the effect of scientist religious affiliation condition (Christian vs. atheist) on trustworthiness ratings (See Figure 4), similar to the previous two studies. To do so, we conducted a mediation analysis with 10,000 bootstrapping estimates using PROCESS model 4 (Hayes, 2013). As in Studies 1-2, the overall indirect effect comparing the atheist and Christian scientists was significant ($b = .31, SE = .11, 95\% CI [.11, .54]$), as was the overall indirect effect comparing the atheist and religion-unspecified scientists ($b = .23, SE = .11, 95\% CI [.02, .44]$). Thus, participants’ lower trustworthiness ratings of the atheist scientist, relative to the Christian and religion-unspecified scientists, were related to their reduced likelihood of attributing prosociality motives to the atheist scientist.

As scientist religious affiliation significantly influenced warmth ratings, we tested whether prosociality motives mediated this effect as well. A mediation analysis similar to that above revealed a significant overall indirect effect of the comparison between the atheist and Christian scientists ($b = .30, SE = .11, 95\% CI [.11, .52]$), as well as a significant overall indirect effect of the comparison between the atheist and religion-unspecified scientists ($b = .22, SE = .10, 95\% CI [.02, .43]$). Thus, participants’ lower warmth ratings of the atheist (vs. Christian and religion-unspecified) scientists were mediated by their reduced likelihood of attributing prosociality motives to the atheist scientist.

Finally, using the same procedure as described above, we tested whether trustworthiness ratings of the scientist would mediate the relationship between scientist religious affiliation and trust in science as a whole, thereby assessing whether a scientist’s religious affiliation influences overall trust in scientists via trust of that specific scientist. The overall indirect effect of the comparison between the atheist and Christian scientist was significant ($b = .06, SE = .03, 95\% CI [.01, .12]$), but the overall indirect effect of the comparison between the atheist and religion-unspecified scientist was not ($b = .01, SE = .02, 95\% CI [-.03, .07]$). Thus, participants’ lower trustworthiness ratings of the atheist, relative to Christian, scientist in turn predicted their overall trust in science. (When warmth was used as the potential mediator instead of trustworthiness, neither overall indirect effect was significant, suggesting this effect was specific to trustworthiness.)

**Discussion.**
Using a different participant population, Study 3 replicated the findings of Studies 1-2 as Christian participants rated an atheist scientist as less trustworthy and warm, and as less motivated by prosociality, than a Christian scientist. There were no effects of scientist religious affiliation on competence ratings, self-interest motives, or intellectual curiosity motives. Furthermore, prosociality motives mediated the relationships between scientist religious affiliation (atheist vs. Christian) and both trustworthiness and warmth ratings. The effects of the religion-unspecified condition were somewhat mixed: participants rated the religion-unspecified scientist as less trustworthy and (marginally) less warm than the Christian scientist, which suggests they may have assumed the former scientist was not religious. However, participants’ prosociality attributions to the religion-unspecified and Christian scientists were equivalent, which suggests social projection (i.e., assuming the scientist was Christian like the participant) may have been at play.

Finally, Study 3 built upon Studies 1-2 by showing that greater trustworthiness ratings of specific Christian (relative to atheist) scientists can ultimately predict trust in science more broadly.

General Discussion

Across three studies, Christian participants rated atheist scientists as less trustworthy and warm than scientists of other religious affiliations (i.e., Christian, Jewish, and Muslim). These effects were not simply due to Christian participants’ denigration of atheist scientists across the board, as in two of the three studies, no differences were obtained on competence ratings. Additionally, these effects cannot be explained by ingroup bias alone, considering Christian participants rated both Jewish and Muslim scientists more positively than atheist scientists. If ingroup bias was the primary driver Christian participants would have rated Jewish, Muslim, and atheist scientists comparably because all three are religious outgroups.

Consistent with our predictions, Christian participants’ lower trustworthiness and warmth ratings of the atheist (relative to Christian, Jewish, or Muslim) scientists were driven by reduced tendencies to attribute prosociality motives to the atheist scientists. In other words, consistent with prior research showing religious believers are stereotyped as more prosocial (e.g., Saroglou et al., 2011), participants associated scientists of any religious background with greater prosociality than non-religious (i.e., atheist) scientists.

The present findings have implications for why religious believers in America – especially Christians – tend to distrust science, as well as for how to bolster trust in science among American Christians. As prior research has shown, science is associated with secularity (Rutjen and Heine, 2016). However, the current studies show scientists who have a religious affiliation, regardless of the specific affiliation, are viewed as more trustworthy, warmer, and more motivated by prosociality than non-religious scientists. Furthermore, trustworthiness ratings of religious scientists ultimately predict trust in scientists in general. Thus, to increase their appeal to religious individuals, it may be helpful for scientists to highlight aspects of their religious identity if applicable. To mitigate or avoid these outcomes amongst religious members of the general public further research should explore interventions targeting prosociality perceptions. For example, it
may help to highlight a scientist’s charitable attributes or the collaborative nature of research (Norenzayan & Shariff, 2008).

One limitation of this research is that atheist participants’ perceptions of scientists were only examined in one study. Although the results suggested atheist participants demonstrate an ingroup bias (i.e., rating atheist scientists more positively than Christian and Jewish scientists), it would be informative to replicate this effect and examine atheists’ perceptions of scientists holding religious affiliations other than Christian or Jewish. Additionally, in Study 3, the effects of exposure to a scientist whose religion was unspecified were mixed. Whereas religion-unspecified scientists were rated similarly to Christian scientists in some domains (e.g., trustworthiness, warmth), they were rated similarly to atheist scientists in other domains (e.g., prosociality motives). It would therefore be fruitful to investigate how and why perceptions of religion-unspecified scientists differ from perceptions of scientists who either do or do not have a religious affiliation. Moreover, the scientists in all studies were described as outspoken members of their religious/non-religious group so their commitment to their religious affiliation would be clear. These results should be replicated with scientists who are not outspoken group members, to determine whether a subtler manipulation of religious affiliation would produce similar effects.

Future studies could examine whether members of religious minority groups in the United States (e.g., Jews, Muslims) also trust religious scientists of any background more than they trust atheist scientists. Relatedly, extending this research to other sociocultural contexts would be informative. For example, science and religion are seen as less compatible in Western countries (e.g., the U.S., the United Kingdom, France) than in many non-Western countries (e.g., Turkey, India, Hong Kong) (Ecklund, Johnson, Scheitle, Matthews, & Lewis, 2016). Perhaps a scientist’s religious affiliation would have less bearing on people’s judgments in the latter countries, where hearing about a religious scientist may be less surprising or counterintuitive. Finally, additional research could explore perceptions of religious and non-religious scientists among Christians of different denominations. Given distrust in science is especially pronounced for Biblical literalists (Evans, 2013), Biblical literalism may amplify Christians’ tendencies to trust religious more than non-religious scientists.

In conclusion, these results underscore the critical role of religion in American Christians’ attitudes toward scientists and science. Although the appointment of Francis Collins, an outspoken Christian, as Director of the National Institutes of Health sparked considerable controversy among those who worried that he may try to promote a biased agenda (Scheitle and Ecklund, 2017), the present studies suggest the prominence of scientists such as Collins may ultimately have positive effects on science acceptance among a large segment of the American population (i.e., Christians). Whether and how non-religious scientists are able to signal their trustworthiness to the American Christian populace in alternative ways (e.g., via prosocial behaviors) remains to be seen.

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