

Negative Stereotypes Cause Christians to Underperform in and Disidentify With Science

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Abstract

Despite Christians being a religious majority in the United States, relatively few pursue higher education and careers in science. Our studies show that stereotypes about Christians being less competent in science than other groups are recognized by both Christians and non-Christians and are openly endorsed by non-Christians (Study 1). Our studies further demonstrate that when these stereotypes become salient, Christians are less interested in and identified with science (Study 2) and underperform on science-relevant tasks (Studies 3–5), compared to non-Christians. Even subtle contextual cues that bear more or less relevance to science are sufficient to compromise Christians' scientific task performance, particularly among the highly religious (Study 5). When these stereotypes are explicitly removed, however, performance differences between Christians and non-Christians disappear. These results suggest that Christians' awareness of the negative societal stereotypes about their group's scientific competence may be partially responsible for the underperformance and underrepresentation of Christians in scientific fields.

Keywords

religiosity, scientific performance, negative stereotypes, social identity threat, stereotype threat

Although over 90% of Americans report believing in God (Gallup, 2011), religious believers account for only 25% of natural science faculty at elite American universities (Calhoun, Aronczyk, Mayrl, & VanAntwerpen, 2007). In general, there are lower proportions of religious believers among science than humanities faculty (Gross & Simmons, 2009). What explains these discrepancies? Given concerns about the dearth of American students who ultimately pursue scientific careers (Moss-Racusin et al., 2012), the lack of diversity of students and faculty in the sciences (Committee on Equal Opportunities in Science and Engineering, 2014), and America's low scientific literacy (on which religious believers trail nonbelievers; Sherkat, 2011), understanding the reasons is critical.

Previous psychological explanations have focused on two differences between religious believers and nonbelievers: intelligence and intuitive versus analytical thinking styles. For instance, a recent meta-analysis found that religiosity and intelligence test performance are inversely correlated (Zuckerman, Silberman, & Hall, 2013). Other studies point to a disjuncture between thinking styles that involve faith and intuition on one hand and scientific and analytical thinking on the other hand. Consistent with this disconnection, religious believers use intuition more than do nonbelievers (Pennycook, Cheyne, Seli, Koehler, & Fugelsang, 2012; Shenhav, Rand, & Greene, 2012). In addition, experimentally inducing people to adopt an analytical mind-set decreases subsequent religious belief (Gervais &

Norenzayan, 2012). Therefore, religious believers' underrepresentation in science is often explained as a product of their presumed lower intelligence, an incompatibility between intuitive and analytical thinking styles, or both.

We propose an additional, novel factor: Negative societal stereotypes about the scientific competency of Christians (who comprise 94% of religious Americans; Gallup, 2012), and about the perceived incompatibility between Christianity and science, may cause Christians to disengage from and underperform in scientific disciplines. The detrimental effects of negative stereotypes on academic identification and performance in have been documented across many groups, including women in science (Cheryan, Plaut, Davies, & Steele, 2009; Murphy, Steele, & Gross, 2007), African Americans in academics (Steele & Aronson, 1995), and low socioeconomic status (SES) individuals in higher education (Stephens, Fryberg, Markus, Johnson, & Covarrubias, 2012). In these studies, increasing the salience of one's group membership or the stereotype itself exacerbates the

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stereotyped behaviors. For example, African Americans asked to indicate their ethnicity on a demographic questionnaire subsequently underperform on standardized test questions and disidentify with academics (Steele & Aronson, 1995). Additionally, women underperform on mathematics tests when led to believe there are gender differences in math ability (Dar-Nimrod & Heine, 2006; Spencer, Steele, & Quinn, 1999), and they demonstrate reduced scientific interest and performance when exposed to cues suggesting that women do not belong in science (Cheryan et al., 2009; Inzlicht & Ben-Zeev, 2000; Murphy et al., 2007).

These stereotypes need not be personally endorsed for such effects to emerge. Indeed, the mere awareness that others may endorse the stereotypes is sufficient to undermine academic performance and identification (Steele, 1997). Furthermore, the impact of negative stereotypes has been shown even for majority groups that are not generally stigmatized in society as a whole. European American men, for instance, are susceptible to underperformance in mathematics when compared to Asian Americans (Aronson et al., 1999) and in athletics when compared to African Americans (Stone, Lynch, Sjomeling, & Darley, 1999).

If Christians disengage from and underperform in science due to their perception of negative stereotypes about Christians and science, these stereotypes may ultimately deter them from scientific disciplines and careers, thereby perpetuating the original stereotypes. Critically, however, when these negative stereotypes are removed, Christians may identify as much with science and perform as well on science-relevant tasks as non-Christians, just as women exhibit equivalent scientific identification and performance to men when stereotypic cues about gender and science are removed (e.g., Cheryan et al., 2009; Murphy et al., 2007; Spencer et al., 1999).

Across five studies, we tested both Christians' and non-Christians' awareness of negative stereotypes about Christians in science (Study 1) as well as the impact of such stereotypes on scientific identification (Study 2) and performance (Studies 3–5). We focused on Christians both because they constitute the majority of religious believers in the United States (Gallup, 2012) and because some preliminary evidence suggests that Christians—unlike other religious groups (e.g., Jews and Muslims)—tend to be stereotyped as less competent than warm (Fiske, Cuddy, Glick, & Xu, 2002).¹ We sought to collect data from approximately 200 participants in Study 1 (which tested stereotype content) and 30 participants per cell in Studies 3–4 (which tested effects of stereotypes on Christians' performance; equivalent sample sizes were obtained in similar studies: Dar-Nimrod & Heine, 2006; Mrazek et al., 2011). In Studies 2 and 5, we stopped data collection at the end of the semester.

Study 1

Method

Participants

Two hundred and two U.S. residents (102 women; $M_{\text{age}} = 34.95$, $SD = 12.09$; 99 Christians, 103 non-Christians),

recruited from Amazon's Mechanical Turk (mTurk) website, participated online in exchange for US\$.50. Thirty-three participants were omitted for failing a basic attention check item, leaving 169 in the final sample.

Procedure and Materials

After providing demographics and their religious affiliation, participants rated four groups—atheists, Christians, Jews, and Muslims—in random order on societal stereotypes. Specifically, they rated on a scale from -3 (e.g., *less competent than the average person*) to 3 (e.g., *more competent than the average person*) whether the group was stereotyped to be higher or lower than the average person in terms of overall competence, competence at science, trust in science, and warmth. To assess whether participants actually endorsed societal stereotypes about the four groups, participants subsequently rated their personal beliefs about each group using the same scales and characteristics.

Results and Discussion

One sample t -tests revealed that participants perceived Christians to be stereotyped as low in scientific competence and trust in science compared to the scale midpoint ($ps < .001$). However, they perceived no stereotype about Christians' general competence ($p > .250$) and perceived Christians to be stereotyped as high in warmth ($p < .001$), suggesting that the negative stereotypes were specific to science (see Table 1 and Figure 1). Notably, both Christians ($M_{\text{competence}} = -.65$, $SE = 1.66$, $p < .005$; $M_{\text{trust}} = -.92$, $SE = 1.71$, $p < .001$) and non-Christians ($M_{\text{competence}} = -1.31$, $SE = 1.30$, $p < .001$; $M_{\text{trust}} = -1.89$, $SE = 1.26$, $p < .001$) recognized the societal stereotypes of Christians as low in competence in and trust of science. Paired samples t -tests comparing Christians to each of the target groups revealed that Christians were also perceived to be stereotyped as lower in scientific competence ($ts < -2.75$, $ps < .001$) and trust in science ($ts < 3.16$, $ps < .010$) than Jews, Muslims, and atheists.

Regarding personal beliefs about Christians, Christian participants believed their own group to be as competent in ($M = 0.14$, $SE = 1.47$, $p > .250$) and trusting of science ($M = -0.18$, $SE = 1.69$, $p > .250$) but more generally competent ($M = 0.68$, $SE = 1.42$, $p < .001$) and warmer ($M = 1.04$, $SE = 1.59$, $p < .001$) than the average person. Non-Christians, by contrast, personally believed Christians were less competent in ($M = -0.84$, $SE = 1.31$, $p < .001$) and trusting of science ($M = -1.46$, $SE = 1.34$, $p < .001$), less generally competent ($M = -0.34$, $SE = 1.11$, $p = .004$), and equally warm ($M = 0.02$, $SE = 1.24$, $p > .250$) compared to the average person (see Figure 2).

Study 2

Study 1 shows the general awareness of negative stereotypes about Christians in science. Furthermore, non-Christians

Table 1. Reported Stereotypes and Personal Beliefs by Group, Study 1.

	Christians Mean (SD)	Atheists	Jews	Muslims
Stereotypes				
Competence in science	-1.00 (1.52)***	1.26 (1.46)***	0.59 (1.46)***	-0.59 (1.56)***
Trust of science	-1.44 (1.56)***	1.78 (1.47)**	0.37 (1.45)**	-0.98 (1.48)***
General competence	-0.06 (1.46)	0.20 (1.50)†	1.07 (1.41)***	-0.56 (1.41)***
Warmth	0.75 (1.64)***	-0.95 (1.56)***	-0.31 (1.52)**	-1.49 (1.43)***
Personal beliefs				
Competence in science	-0.38 (1.47)***	0.96 (1.47)***	0.49 (1.15)***	-0.22 (1.28)**
Trust of science	-0.85 (1.64)***	1.58 (1.53)***	0.37 (1.21)***	-0.53 (1.27)***
General competence	0.14 (1.36)	0.46 (1.31)***	0.69 (1.16)***	-0.15 (1.19)†
Warmth	0.50 (1.50)***	-0.12 (1.38)	0.12 (1.24)	-0.51 (1.38)***

Note. N = 169.

p < .01; *p < .001; †p < .10.

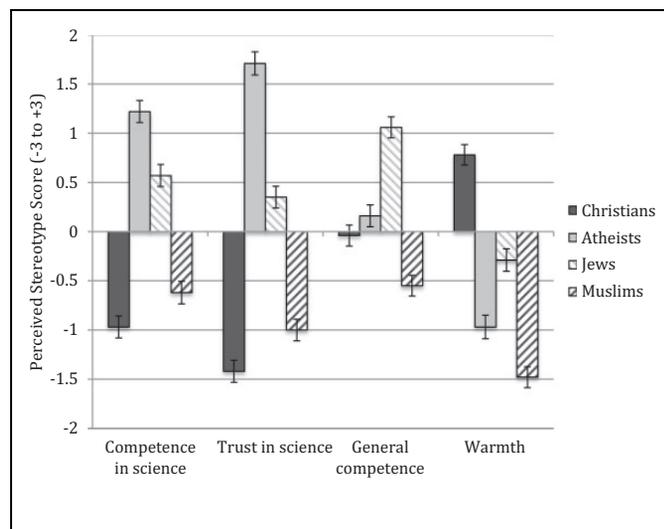


Figure 1. Reported stereotypes associated with each group, Study 1 (error bars represent standard errors of means).

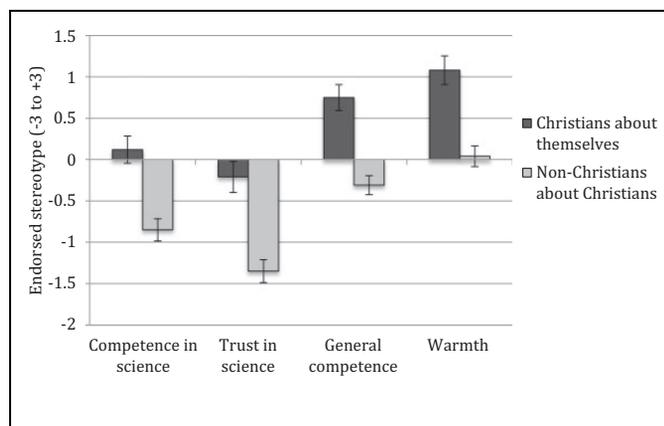


Figure 2. Personal beliefs about Christians by group, Study 1.

personally believe that Christians are inferior at and distrustful of science, suggesting that the stereotypes are both pervasive and socially acceptable. In Study 2, we tested the possibility

that these stereotypes may influence Christian college students' own feelings about science, just as women's and minorities' feelings about science can be affected by stereotypes about their groups (Cheryan et al., 2009; Murphy et al., 2007).

Method

Participants

One hundred psychology undergraduates (39 men, 61 women; $M_{age} = 19.36, SD = 1.88$; 62 Christians, 35 non-Christians, 3 unspecified) completed a laboratory study for credit. Participants reported their religious affiliation in a prescreening survey. Three participants who suspected that the news article was not real and three participants whose religious affiliation was unspecified were dropped from the analyses as was one outlier with an extreme Cook's *D* score of .10 (5 *SD* above the mean). The remaining 93 participants were randomly assigned to the high-threat ($n = 34$), low-threat ($n = 28$), or no-article ($n = 31$) condition.

Procedure and Materials

The study was described as assessing the relationship between identity, interests, and abilities. Participants in the high-threat (low-threat) condition first read an article allegedly published by the local newspaper, presented as "background information." The article described the results of a bogus poll, suggesting that most students at the university (78%) believed Christians were bad (good) at science. Participants in the no-article condition received the dependent measures without reading an article.

Next, participants completed a 20-item self-reported measure of their identification with science, adapted from Marsh and O'Neill (1984; e.g., "I have never been very excited about science" [reverse-coded], "I am quite good at science").

Results and Discussion

We predicted that Christians would identify less with science than non-Christians after reading that Christians were

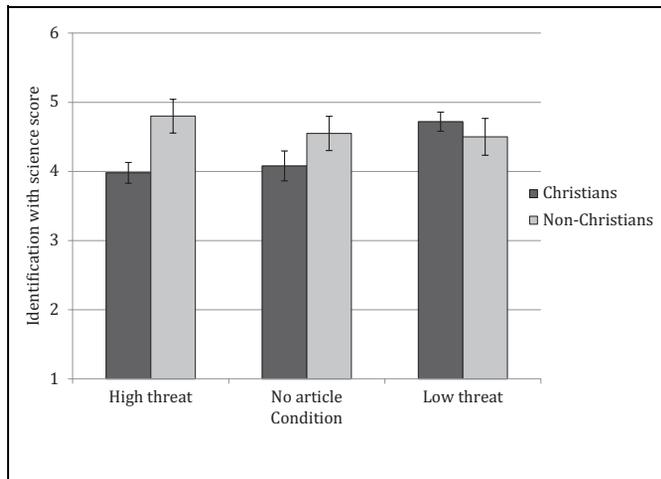


Figure 3. Identification with science as a function of threat condition and Christian identity, Study 2.

stereotyped as bad at science but not after reading that Christians were stereotyped as good at science. We had no a priori predictions about the control (no-article) condition.

A 3 (Condition: High-Threat vs. Low-Threat vs. No-Article) \times 2 (Religious Identity: Christian vs. Non-Christian) analysis of variance revealed that Christians ($M = 4.26$, 95% confidence interval [CI] = [4.06, 4.46]) reported weaker identification with science than did non-Christians overall ($M = 4.67$, 95% CI = [4.41, 4.94]), $F(1, 87) = 6.19$, $p = .015$, $\eta^2 = .07$. However, this main effect was qualified by a two-way interaction, $F(2, 87) = 3.59$, $p = .032$, $\eta^2 = .08$. Simple effects tests indicated that in the high-threat condition, Christians ($M = 3.98$, 95% CI = [3.67, 4.30]) identified significantly less with science than non-Christians ($M = 4.80$, 95% CI = [4.34, 5.26]), $F(1, 87) = 8.55$, $p = .004$, $\eta^2 = .09$. This difference also emerged in the control condition (Christians: $M = 4.08$, 95% CI = [3.73, 4.43]; non-Christians: $M = 4.72$, 95% CI = [4.28, 5.16]), $F(1, 87) = 5.21$, $p = .025$, $\eta^2 = .06$. In the low-threat condition, there was no significant difference between Christians ($M = 4.72$, 95% CI = [4.28, 5.16]) and non-Christians ($M = 4.50$, 95% CI = [4.02, 4.97]), $F(1, 87) = .46$, $p > .250$, $\eta^2 = .01$ (see Figure 3).

Study 3

Study 2 suggests that Christians' science identification tends to suffer unless the antiscience stereotype is explicitly removed—that is, unless Christians are given information suggesting that they are just as competent in science as other groups. Perhaps because of the social acceptability of expressing negative stereotypes about Christians in science (demonstrated in Study 1), Christians may experience a default state of feeling that science is incompatible with their religious identity, similar to low-SES students in higher education (Stephens et al., 2012). Notably, however, Christians identify as much with science as non-Christians when reassured that others do not endorse the negative stereotypes. We next tested the consequences of these stereotypes for Christians' scientific task performance.

Method

Participants

One hundred and eighty-three mTurk workers (103 men, 80 women; $M_{\text{age}} = 33.5$, $SD = 11.7$; 71 Christians, 112 non-Christians) participated in exchange for US\$.50. Eleven participants were omitted: one for taking the study twice, three for completing the study in 2 min or less, five for correctly guessing the hypothesis, and two statistical outliers with Cook's D scores above .035 (more than 3 SD above the sample mean). The remaining 172 participants were retained.

Procedure and Materials

Participants were randomly assigned to either a high-threat condition, in which they read a paragraph stating that Christians perform worse on scientific reasoning tasks than non-Christians ($n = 91$), or a low-threat condition, in which they read a paragraph stating that no performance differences between Christians and non-Christians exist ($n = 81$). The paragraphs were presented in the form of background information (see Spencer et al., 1999).

Next, to measure performance on a task that participants associated with scientific ability, all participants completed an alleged "scientific reasoning test," which involved indicating whether 15 syllogisms (i.e., sets of premises and conclusions) reflected good or poor reasoning (e.g., *All ghosts are electrified. No cats are electrified. Therefore, no ghost is a cat*; Markman, Lindberg, Kray, & Galinsky, 2007). The total number of correct solutions served as the dependent measure. Finally, in this study as well as in subsequent studies, participants completed a demographic survey and suspicion probe.

Results and Discussion

We predicted that being told there are differences in scientific reasoning ability between religious groups would lead Christian participants to solve fewer syllogisms correctly than non-Christian participants. We expected Christians and non-Christians to perform comparably when told that no differences in scientific reasoning ability exist. We included participant age as a covariate because there were age differences between Christian and non-Christian participants (i.e., Christians were older than non-Christians), $F(1, 168) = 13.50$, $p < .001$ and (marginally) between conditions (i.e., high-threat participants were older than low-threat participants), $F(1, 168) = 3.35$, $p = .069$.²

A two-way analysis of covariance (ANCOVA) controlling for age revealed an interaction between Christian identity and threat condition, $F(1, 167) = 3.63$, $p = .059$, $\eta^2 = .02$, which—though marginal—was consistent with our hypotheses. Specifically, Christians ($M = 9.71$, 95% CI = [8.92, 10.49]) underperformed relative to non-Christians ($M = 11.59$, 95% CI = [11.01, 12.16]) in the high-threat condition, $F(1, 167) = 14.26$, $p < .001$, $\eta^2 = .08$ but performed as well as non-Christians in the low-threat condition ($M_{\text{Christians}} = 10.89$, 95%

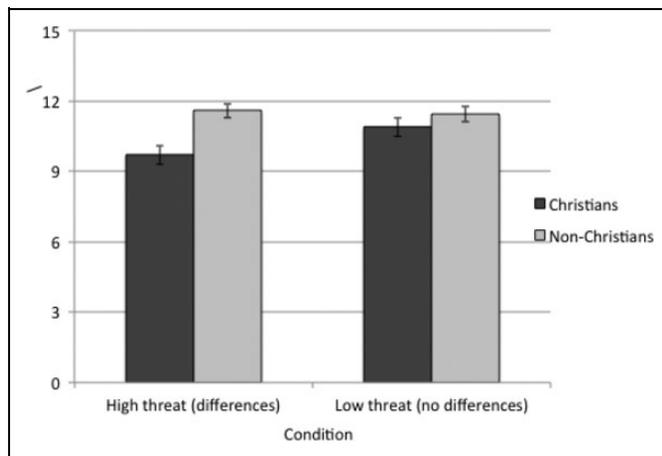


Figure 4. Syllogisms solved (out of 15) as a function of threat condition and Christian identity, Study 4.

CI = [10.11, 11.68]; $M_{\text{non-Christians}} = 11.44$, 95% CI = [10.81, 12.07], $F(1, 167) = 1.12$, $p > .250$, $\eta^2 = .007$ (see Figure 4). Additionally, there was a significant main effect of religious identity (non-Christians outperformed Christians), $F(1, 167) = 11.08$, $p = .001$, $\eta^2 = .06$.

Although Study 3 suggests that Christians' awareness of negative stereotypes about their group compromises science-related task performance, it is unclear whether this performance difference emerges even when the stereotypes are not made salient or only when Christians read information impugning their group's scientific ability. That is, without receiving any information about religious differences in performance, would the mere description of a task as measuring "scientific reasoning" have been sufficient to elicit Christians' underperformance relative to non-Christians? To address this question, we recruited a separate sample of 213 mTurk workers (117 Christians) to complete the syllogisms without reading any background information. Similar to the high-threat condition in Study 3, a one-way ANCOVA controlling for age revealed that Christians ($M = 9.97$, 95% CI = [9.55, 10.38]) solved (marginally) fewer syllogisms correctly than did non-Christians ($M = 10.51$, 95% CI = [10.05, 10.97]), $F(1, 210) = 2.94$, $p = .088$, $\eta^2 = .01$.

Study 4

Study 3 showed that when Christians believe a task is science relevant, they underperform compared to non-Christians. That this effect could only be completely mitigated by explicitly removing the antisience stereotype about Christians speaks to the pervasiveness of this stereotype and supports the notion that Christians may see scientific tasks as incompatible with their religious identity.

Past research demonstrates that women in male-dominated environments underperform on math problems but not verbal problems (on which they experience no negative stereotype; Inzlicht & Ben-Zeev, 2000). Because Study 1 showed that Christians perceive themselves as targets of negative

stereotypes about scientific but not general competence, we predicted that the negative effects of stereotype on performance should only emerge on tasks that Christians believe to be science relevant. Thus, in Study 4, we described the task as either scientific or not.

We used the remote associates test (RAT) as our dependent measure because its solution norms are well established (Dorfman, Shames, & Kihlstrom, 1996). This allowed us to compare performance across relatively easy (45–80% solution rate) and relatively difficult (20–40% solution rate) task items, in order to investigate the mechanism behind our findings. If Christians' underperformance is anxiety-driven, the performance differences should emerge on difficult stereotypic tasks (which are more likely to trigger arousal) but not easy stereotypic tasks (on which performance would be preserved and may even see improvement; O'Brien & Crandall, 2003). However, if Christians' underperformance is due to disengagement from science, performance differences should emerge on both difficult and easy stereotypic tasks, as stigmatized group members should see both tasks as incompatible with their identity (see Stephens et al., 2012).

Method

Participants

One hundred and twenty-eight mTurk workers (55 Christians, 72 non-Christians; 58 men, 69 women; $M_{\text{age}} = 35.2$, $SD = 12.7$) participated in exchange for US\$50. Two participants who took the study twice and two statistical outliers whose Cook's D scores (.15 and .07) fell at least 3 SD above the sample mean were omitted, leaving 123 in the final sample.

Procedure and Materials

The procedure was identical to Study 3, with two exceptions. First, to manipulate high or low threat, respectively, we described the task as measuring scientific reasoning ($n = 57$) or "intuitive thought" ($n = 66$). We also stated that we were interested in performance differences between Christians and non-Christians, although (unlike in Study 3 but consistent with prior research, e.g., Spencer et al., 1999) we did not specify the expected direction of the differences. Second, rather than solving syllogisms, participants completed 10 RAT items from Kray, Galinsky, and Wong (2006), in which they were given three words (e.g., *golf*, *beans*, and *envy*) and had to generate a fourth word related to all of them (*green*). All items were randomized.

Results and Discussion

We predicted that Christians would generate fewer correct solutions than non-Christians in the high-threat (scientific reasoning) condition but not in the low-threat (intuitive thought) condition. A two-way ANCOVA controlling for age revealed main effects of age, $F(1, 118) = 26.26$, $p < .001$, $\eta^2 = .18$, and Christian identity, $F(1, 118) = 4.10$, $p = .045$,

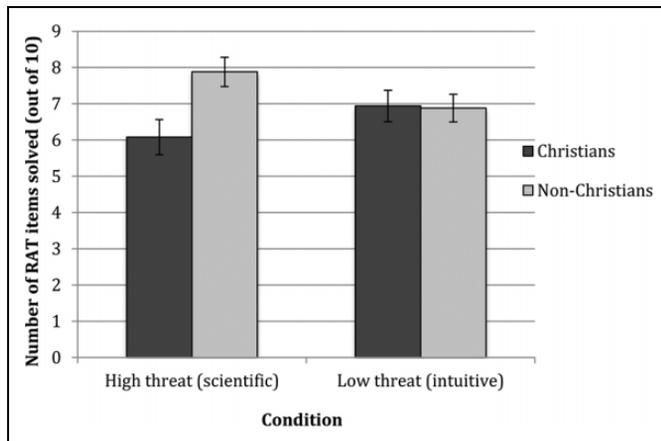


Figure 5. Remote associates test items solved as a function of threat condition and Christian identity, Study 4.

$\eta^2 = .03$, as well as the predicted interaction between Christian identity and condition, $F(1, 118) = 4.67, p = .033, \eta^2 = .04$. Simple effects tests indicated that Christians ($M = 6.09, 95\% \text{ CI} = [5.13, 7.05]$) performed worse than non-Christians ($M = 7.88, 95\% \text{ CI} = [7.08, 8.68]$) when told the task measured scientific reasoning, $F(1, 118) = 8.05, p = .005, \eta^2 = .06$, whereas Christians and non-Christians performed equally well when told the task measured intuitive thought ($M_{\text{Christians}} = 6.94, 95\% \text{ CI} = [6.08, 7.80]$; $M_{\text{non-Christians}} = 6.89, 95\% \text{ CI} = [6.13, 7.65]$), $F(1, 118) = .01, p > .250, \eta^2 < .01$ (see Figure 5).

Next, we tested whether Christians underperformed on scientific reasoning tasks relative to non-Christians regardless of the difficulty of the items (which would suggest that Christians disidentify with science-relevant domains) or whether they underperformed just on difficult items (which would suggest that Christians experience anxiety in science-relevant domains). A 2 (Christian Identity) \times 2 (Threat Condition) \times 2 (Easy vs. Difficult Items) mixed-model ANCOVA, with repeated measures on the last factor, revealed only a main effect of item difficulty (i.e., participants solved more easy than difficult items correctly), $F(1, 118) = 14.01, p < .001, \eta^2 = .11$, in addition to the effects described earlier. The three-way interaction was not significant ($p > .250$). Thus, Christians' underperformance on "scientific" tasks extends to both easy and difficult items, suggesting that Christians disengage from any task described as assessing scientific reasoning and not just from tasks that are particularly difficult.³

Study 5

If stereotypes compromise Christians' scientific abilities in everyday college contexts, then mere contextual cues relevant to science should also trigger underperformance (Cheryan et al., 2009; Murphy et al., 2007). Moreover, because the impact of negative stereotypes is strongest among highly identified group members (whose group membership is important to their self-concept; Schmader, 2002), religiosity should moderate the

effects of such cues. We tested these hypotheses by having participants complete a task in either a divinity school, which Christians should perceive as compatible with their (religious) identity, or a physical sciences building, which Christians should perceive as less compatible with their identity.

Method

Participants

One hundred and seven psychology students (43 men, 64 women; $M_{\text{age}} = 20.88, SD = 3.74$) participated in exchange for credit. Prescreening revealed 39 participants as Christian and 64 as non-Christian. Four participants did not specify their religious affiliation and were dropped from analyses. Additionally, 11 participants were omitted due to suspicion and two statistical outliers were excluded because their Cook's D scores (.15 and .16) were more than 5 SD above the sample mean. The final sample thus consisted of 90 individuals.

Procedure and Materials

One week prior to the study, participants completed an online demographic survey, which included five religiosity questions (e.g., "What is the general importance of God in your life?") administered on 11-point scales (1 = *not at all*, 11 = *extremely*; Preston & Epley, 2009). The day before the study, participants were e-mailed instructions to take the study in either the divinity school (low-threat context; $n = 47$) or the physical sciences building (high-threat context; $n = 43$). To increase awareness of the context, upon arrival to their assigned building, all participants read an adapted mission statement of the relevant department. Although the mission statement for the divinity school stated that its faculty and students believed religion was reconcilable and compatible with other disciplines in the humanities and sciences, the mission statement for the physical sciences division did not mention any nonscience disciplines.

Next, participants completed a measure described as a logical reasoning test, which consisted of 10 questions from the former Graduate Record Examination (GRE) analytical section (e.g., "David ranks 7th from the top and 28th from the bottom in a class. How many students are there in the class?" (a) 36, (b) 35, (c) 34, (d) cannot be determined, (e) none of the above; $M = 5.31, SD = 1.53$).

Results and Discussion

We predicted that Christians' religiosity would be negatively correlated with the number of questions solved correctly in the high-threat condition but not in the low-threat condition. In other words, we expected religiosity to moderate the effects of context (physical sciences building vs. divinity school) on Christians' performance. We expected no such effect for non-Christians.

Because Christians ($M = 7.32, SD = 2.73$ on an 11-point scale) and non-Christians ($M = 2.74, SD = 1.96$) differed

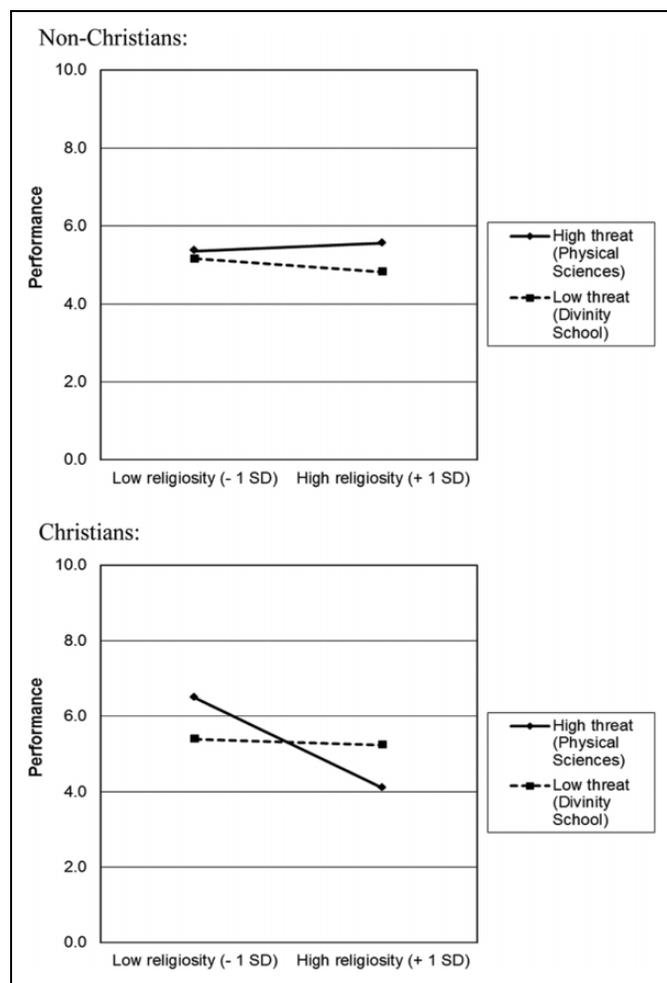


Figure 6. Correct solutions as a function of Christian identity, threat context, and religiosity (± 1 SD), Study 5.

significantly in religiosity, $t(88) = -10.40$, $p < .001$, we analyzed the data as two separate Context (0 = *physical sciences*, 1 = *divinity school*) \times Religiosity (mean centered) Interactions for Christians and non-Christians, using multiple regression (Aiken & West, 1991).⁴

Confirming our hypothesis, a two-way threat Context \times Religiosity multiple regression was significant for Christians ($b = .72$, $SE = 0.17$), $t(28) = 4.34$, $p < .001$, but not for non-Christians ($p > .250$; see Figure 6). Among Christians, religiosity correlated negatively with performance in the high-threat context ($b = -.63$, $SE = 0.14$, $t(28) = -4.45$, $p < .001$) and was uncorrelated with performance in the low-threat context, $b = .09$, $SE = 0.09$, $t(28) = 1.03$, $p > .250$.

General Discussion

These studies demonstrate that increasing the salience of pervasive antisience stereotypes about Christians (Study 1) can lead Christians to underperform on scientific tasks (Studies 3–5) and disidentify with science (Study 2), especially for the highly religious (Study 5). Although the differences between

Christians and non-Christians disappear when the stereotypes are explicitly removed, the overall effects of these stereotypes are pernicious. As with other groups, Christians may face a perpetuating cycle whereby they underperform due to the existing stereotypes, thereby confirming those original stereotypes.

Through what mechanism(s) do the negative effects of these stereotypes emerge? One possibility is that Christians' anxiety about confirming the stereotypes undermines their performance and engagement (Steele & Aronson, 1995). Alternatively, Christians may disidentify with fields perceived not to "match" their religious identity (i.e., science), either because they believe that others stereotype them as not belonging in science (Steele, Spencer, & Aronson, 2002; Stephens et al., 2012) or because they themselves stereotype their (religious) values as incompatible with science (see Nosek, Banaji, & Greenwald, 2002).

Study 4, in which Christians underperformed on both difficult and easy (presumably less anxiety inducing) scientific reasoning items, seems inconsistent with the anxiety explanation, although future research could test the role of anxiety more directly (e.g., by measuring emotions or working memory prior to the task). Regarding the distinction between other stereotyping and self-stereotyping, Study 1 demonstrated that Christians did not personally endorse antisience stereotypes about their group, despite their awareness of the existence of such stereotypes. We thus doubt that self-stereotyping is the *only* reason behind Christians' underperformance. However, perhaps being reminded of others' negative stereotypes leads Christians to eventually internalize perceptions of themselves and their group as unscientific.

Unlike women and ethnic minorities, on whom much research about negative intellectual stereotypes has focused, American Christians are a dominant majority group (77% of the population; Gallup, 2012) and not one generally perceived as disadvantaged. Yet context matters, and in scientific domains, different proportions and a potentially very different climate exist. Christian underrepresentation in science may be caused by self-selection (choosing not to enter science-related fields) as well as underperformance (not succeeding in said fields), both of which are exacerbated by negative stereotypes.

That Christians constitute such a large proportion of the U.S. population means that factors discouraging their participation in scientific disciplines may vastly impact the potential flow of students into science-related careers. Diagnosing such barriers is a critical step in developing strategies for encouraging more people to pursue their scientific ambitions. Previous research has found that the pernicious effects of negative stereotypes on academic performance and interest can be mitigated by affirming personal values (Cook, Purdie-Vaughns, Garcia, & Cohen, 2012), increasing feelings of belongingness (Walton & Cohen, 2011), or exposing individuals to counterstereotypic role models (Marx & Goff, 2005). Future research should tailor such strategies to increase Christians' participation in science. If effective, these strategies would be vital tools for increasing scientific involvement and literacy in American society.

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Notes

1. In Studies 2–4, we asked Christian participants whether they identified as “Catholic” (range from 32% in Study 4 to 55% in Study 2), “Protestant” (range from 26% in Study 3 to 51% in Study 4), or (Studies 3–4) “other” (32% in Study 3, 17% in Study 4). Among Christians, there were no main effects of denomination or interactions with condition on science identification (Study 2) or performance (Studies 3–4; $ps > .19$). However, given our low statistical power to detect such interactions, and the absence of more fine-grained distinctions, we do not consider these null results conclusive and believe the potential effects of denomination (and related variables such as fundamentalism) warrant future investigation.
2. In Studies 3–4, highest education (1 = *some high school*, 6 = *doctorate or professional degree*) was unrelated either to Christian identity or condition ($ps > .250$), and controlling for it did not affect our results.
3. When the easy and difficult items were analyzed separately, the Condition \times Christian Identity Interaction was significant for difficult items ($p = .028$) and approached significance for easy items ($p = .109$). Notably, the difference between Christians’ and non-Christians’ performance in the scientific reasoning condition was significant for both sets of items ($ps = .012$).
4. The three-way interaction between condition, religious identity (0 = *non-Christian*, 1 = *Christian*), and religiosity was marginal ($b = .58$, $SE = 0.32$), $t(82) = 1.85$, $p = .068$, likely because religiosity (on which Christians scored higher than non-Christians) was mean centered across the entire sample, regardless of religious identity.

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