THE IMPACT OF RELIGIOUS BIAS ON MENTAL HEALTH AND ACADEMIC PERFORMANCE: IMPLICATIONS FOR DIVERISTY IN ACADEMIA AND SCIENCE FIELDS

by

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DISSERTATION ABSTRACT

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Title: The Impact of Religious Bias on Mental Health and Academic Performance: Implications for Diversity in Academia and Science Fields

Science thrives when there is a continuous flow of new ideas and diverse generations of scholars contributing to the field. Although academic institutions aim to encourage diverse viewpoints, a culture of atheism among university faculties may unwittingly be contributing to an anti-religious atmosphere. The main focus of this dissertation is to investigate people's attitudes toward religious individuals, and how these attitudes affect the religious believers' mental health and academic performance. Study 1 (N = 899) found that people tend to explicitly report that religious believers have lower intelligence, but to implicitly associate them with higher intelligence. Although this is the case, faculty members, particularly those from secular institutions, did not have this implicit association and had the strongest congruity between their explicit and implicit intelligence preferences. Studies 2-3 showed that religious believers of diverse backgrounds reported experiencing overt and covert forms of religious bias, including biases related to their academic ability. Religious believers reported that they encountered more incidences of overt and covert forms of religious bias inside of higher education than outside of academia. Experiences of religious microaggressions significantly

predicted higher rates of depression in Study 2 (N = 383) and marginally in Study 3 (N = 129).

Finally, Study 4 (N = 169) found that compared to other religious groups, Christians were stereotyped to lack science competency. Study 5 (N = 237) demonstrated that these stereotypes applied to Christian college students and was at a comparable rate to how women are stereotyped to lack scientific competency and interest. Study 6 (N = 93) demonstrated that these negative stereotypes cause Christian college students to become less interested in and identify less with sciences. They also caused Christian college students to underperform on science-relevant tasks, especially those students with a stronger religious identity (Study 7; N = 90). These studies reveal that stereotypes play a key role in pushing religious believers out of science. Implications and future directions in the representation of religious believers in academia and science fields are discussed.

This dissertation includes previously published and unpublished co-authored material.

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CHAPTER I

INTRODUCTION

The United States is a religious country. "In God we trust" appeared on U.S. coins as early as 1894, and was adopted as the country's official motto in 1956. Religiosity is often assumed to signal morality and in particular, trustworthiness (Edgell, Gerteis, & Hartmann, 2006; Tan & Vogel, 2008). Trust is a valuable form of social capital and an important predictor of economic success (Arrow, 1972; Putman, 1993); thus, religious individuals may enjoy certain privileges in America. Given that the level of people's trust increases with the religiosity of the trustee (Tan & Vogel, 2008), non-religious individuals are disadvantaged in America.

A growing body of research has begun to document the prejudice that people without religious affiliation experience in the United States. These studies show that atheists are consistently found to be among the least trusted and liked people in America (Gallup, 2012; Gervais, Shariff, & Norenzayan, 2011; Yancey, 2010). In addition, those who identify as having no religious affiliation are perceived to lack morals, even if they do not specifically identify as an agnostic or atheist (Gervais et al., 2011; Hood, Spilka, Hunsberger & Gorsuch, 1996).

However, context is important. Research with religious prejudice suggests that while non-religious individuals are disadvantaged in the general American public, religious believers, especially Christians, experience prejudice inside the halls of academia. Professors and scientists, particularly natural and social science faculty members at elite universities, identify as being less religious and more non-religious than the general American population (Ecklund & Scheitle, 2007; Gross & Simmons, 2009;

Pew Research Center, 2009). Although academic institutions aim to encourage diverse viewpoints, a culture of atheism among university faculties may unwittingly be contributing to an anti-religious atmosphere. Religious undergraduates' reports of bias rival the levels of racial prejudice reported by minority groups such as African Americans (Hyers, 2007; Hyers & Hyers, 2008). Hyers and Hyers (2008) found that these incidents ranged from overt forms, such as stereotyping of religious believers as ignorant, and professors making derogatory and dismissive remarks about religious individuals, to covert forms or general insensitivities toward religion, such as using the Lord's name in vain or other general insensitivities regarding religion.

Religious believers not only experience prejudice at the undergraduate level, but also at the graduate admissions level. Psychology faculty members (n = 356) perceived applicants with Christian backgrounds as being less competent and less desirable in the graduate school admissions process despite the applicants having identical materials and scores (Gartner, 1986). These professors specifically indicated that they had more positive feelings and less doubt about the ability of the student with no mention of religion on his or her application and were more willing to admit the applicant with no mention of religion over the otherwise identical religious applicant. Of those who manage to be admitted to graduate school, religious believers report experiencing bias in their graduate programs (Hodge, 2006). Religious individuals also experience discrimination at the faculty hiring stage (Yancey, 2011), highlighting how academics are willing to discriminate against colleagues based on religious and ideological differences (Inbar & Lammers, 2012; Yancey, 2011).

These findings are consistent with psychological research showing how prejudice and stereotypes can negatively affect majority groups depending on the comparison group and context. For example, although European American males tend to be a privileged group in the US, they can nevertheless experience and suffer from negative beliefs about their group. European American men have been shown to underperform on tasks described to measure athletic ability when compared to African Americans because of the stereotype that African Americans have greater athletic aptitude (Stone, Lynch, Sjomeling, & Darley, 1999). European American men who are told that Asian Americans perform better in mathematics (Aronson, Lustina, Good, Keough, Steele, & Brown, 1999) underperform when compared to men not given this same threatening information. These studies show the negative effects stereotypes can have on majority groups who are not generally stigmatized in society. These studies also highlight how a minority group can experience "positive" stereotypes, which can negatively affect a majority group (European American men), although positive stereotypes about minority groups can also negatively affect these groups in some cases (e.g., the "model minority" myth of Asian Americans; Kim & Lee, 2014).

Ideological Diversity

Psychology has long been a field that values diversity. Most of the research has focused on demographic diversity (e.g., ethnicity, gender), and, until recently, only limited attention has been paid to ideological diversity. At the 2011 Society of Social Psychology and Personality (SPSP)'s annual conference, Jonathan Haidt asked his audience of about 1,000 attendees to raise their hands to identify their political affiliations. Three hands were counted for being "conservative or on the right," 12 for

"libertarians," and 20 for "moderate or centrist." A large majority (roughly 80 percent of the audience) identified as liberal. Haidt concluded that given the diversity of political beliefs in America, this was statistically impossible if the audience was representative of the American population.

Following this, Inbar and Lammers (2012) surveyed members of SPSP to examine the political diversity of social psychologists, and how discrimination and bias may affect the political representation of psychologists. Inbar and Lammers (2012) found a political representation reflective of Haidt's audience where 85% of participants identified as a liberal, nine percent as a moderate, and six percent as a conservative. In addition, Inbar and Lammers (2012) found that 82% of those who identified as a conservative reported experiencing a hostile climate towards their political beliefs despite liberals' tendency to report that they do not perceive a hostile climate towards conservatives. Conservatives' concerns were consistent with the reported attitudes of participants who identified as liberals; 82% of liberals indicated that they would be biased against a conservative when hiring a faculty job candidate and when reviewing the grant application of a known conservative; 78% indicated bias in reviewing a paper of a conservative author and 56% indicated hesitancy in inviting a conservative colleague to be part of a conference symposium (Duarte et al., 2015; Inbar & Lammers, 2012). In addition, the more liberal participants identified themselves, the more likely they reported a willingness to be biased against a conservative (despite that being more liberal is related to being more likely to report that they perceive there to be less of a hostile environment for conservatives). As success in academia depends on grant funding, journal publications and presentations, and tenure hiring and promotion, Inbar and Lammers

(2012) highlight how discrimination and bias are playing a key role in the lack of political diversity of Psychology.

Science thrives when there is a continuous flow of new ideas and diverse generations of scholars contributing to the field. Studies show that people learn better in racially heterogeneous academic environments, and that exposure to new perspectives and beliefs helps people to develop more complex thinking skills (Crosby, Iyer, Clayton, & Downing, 2003; Gurin, Dey, Hurtado, & Gurin, 2002). Groups composed of members with different perspectives and knowledge make higher quality decisions and perform better (Argote, Gruenfeld, & Naquin, 2000; Homan, van Knippenberg, Van Kleef & De Dreu, 2007). Because scientists tend to come from similar educational, socioeconomic, and religious (i.e., non-religious or religiously liberal) backgrounds (Ecklund & Scheitle, 2007), the need to obtain different perspectives is especially critical.

Not only does ideological diversity lead to better science, but researchers argue that the opposite can also be true. Established psychological research shows that people are susceptible to confirmation bias and groupthink, which can lead to unfairness (Janis, 1992; Schulz-Hardt, Frey, Lüthgens, & Moscovici, 2000). For example, in the peer-review publication process, researchers may be more likely to criticize findings that contradict their beliefs and to be more methodologically permissive of findings that are congruent with their values and viewpoints, compromising and hindering the objective nature of science (Duarte et al., 2015). Duarte and colleagues (2015), and Inbar & Lammers (2012) argue that the credibility of science is damaged by researchers whose ideological stances and values color the questions they ask and the interpretations they conclude with their data. In the field of Psychology, Duarte and colleagues (2015)

highlight how liberal values and assumptions have 1) biased researchers' operant definitions, leading to misguided findings and conclusions, and 2) deterred researchers from examining topics that may contradict the prevailing liberal narrative.

In response to Duarte and colleagues (2015), some researchers have argued that ideological diversity should not just be limited to political diversity, but also include religious diversity (Motyl & Iyer, 2015). Motyl and Iyer (2015) highlighted similarities in the generally negative narratives in Psychology about conservatives and religious believers (and the generally positive narratives about liberals and atheists), demonstrating how political conservatives and religious groups may face similarly hostile environments and assumptions that deter them from entering academia and the sciences. In addition, Crawford and colleagues (2015) argued that given the relationship between religiosity and political orientation, addressing one could lead to greater representation in the other. Although this may be the case, there has been limited research systematically examining religious prejudice and the impact it has on the representation of believers in academia and science.

Purpose and Aim of Dissertation

Therefore, the main focus of my dissertation is to investigate the stereotypes and prejudices experienced by religious individuals and how they affect the mental health and academic performance of these individuals. I am also interested in examining how context, in particular, exposure to and experience within academia, affects religious prejudice and religious believers' experience with bias. Religious bias in academia threatens to disadvantage religious students and to discourage them from joining the academy, which perpetuates the cycle of exclusion and limits diversity in academia. My

dissertation research will have three main objectives and is divided into three research phases. The first goal is to examine people's attitudes and beliefs about religious believers, the second is to investigate how these attitudes affect the mental health and academic performance of these individuals, and the third is to understand how the academic context influences the development, experience, and impact of religious prejudice.

To accomplish the first purpose, I use various psychological methods in the three research phases to understand people's perceptions and attitudes towards religious believers. I will examine explicit versus implicit attitudes in Phase I, subtle versus overt religious prejudice in Phase II, and societal versus personal religious stereotypes in Phase III. This diversity in measurement allows for a more comprehensive investigation of people's attitudes towards religious believers. Starting in Phase II, I examine how religious prejudice impacts believers' mental health and well-being. Finally, in Phase III, I investigate how religious stereotypes impact believers' academic performance. The three research phases take into consideration the academic context and aim to increase knowledge and awareness of religious bias inside and outside of academia.

"Religious believers" is a broad category, and thus, it is important to define the population I am studying for my dissertation. Religious believers consist of many faith groups including those who identify as Buddhists, Christians, Jews, Hindus, and Muslims. Although they typically share the commonality of believing in the existence of a God or gods or following a particular religious leader/set of beliefs, Christians differ from other religious groups in that they are part of the majority group in America.

Past studies examining the prevalence of religious bias in academia have included mainly Christian participants (Gartner, 1986; Hodge, 2006; Hyers & Hyers, 2008). Because of this, it is not clear whether religious bias in academia is unique to Christians or whether anyone who has a belief in the existence of a God or gods (i.e. theists) or identifies with a religion experiences prejudice in academia. For my dissertation, I will expand beyond Christians to include religious individuals of different faith traditions to better understand religious bias in academia. Nonetheless, some of my dissertation research will solely focus on Christians to better target the specific stereotypes and prejudices they experience.

Research Questions and Hypotheses

Below are the main research questions and hypotheses (H) for each dissertation research phase.

Phase I (Study 1). What are people's explicit and implicit associations between religiosity and intelligence? Do these attitudes differ depending on one's academic affiliation and exposure?

H1.1 University Differences: Participants from secular universities will explicitly and implicitly associate believers with lower intelligence than participants from religious universities.

H1.2 Discipline Differences: People from the life sciences will explicitly and implicitly view believers to be less intelligent than those from the non-life sciences.

H1.3 Academic Sample Differences: Faculty members will explicitly and implicitly associate believers with lower intelligence than university students and community members.

Phase II (Studies 2-3). How are people's negative attitudes about religious individuals expressed? How do these biases impact religious individuals' mental health? Do people's experiences of subtle and overt forms of religious bias differ depending on the academic context?

H2.1 Mental Health Outcomes: Experiences of religious bias will be associated with poorer mental health outcomes for religious individuals.

H2.2 Rates of Microaggressions: Students will experience higher levels of religious bias than non-students. People will experience higher levels of religious bias inside of academia than outside of academia.

Phase III (Studies 4-7). What are the societal and personal stereotypes regarding religious individuals' academic and scientific competence? How do these stereotypes impact the academic performance of religious individuals?

H3.1 Cultural versus Personal Stereotypes: Participants will indicate that Christian and female students are culturally stereotyped as being less interested, performing worse, and being less competent in the sciences, and atheist and male students are stereotyped as being more interested, performing better and being more competent in the sciences than an average college student. Non-Christians will indicate that they personally believe in these cultural stereotypes for Christian college students in the domain of science, general intelligence, and general competence, but not for female students.

H3.2 Science Identifications and Performance: I predict that compared to non-Christians, Christians in a stereotype threat condition will identify less with science and have lower performance on science-related tasks.

This dissertation contains published and unpublished co-authored materials from Cheng, Pagano, and Shariff (in press) and Rios, Cheng, Totten, and Shariff (2015). Background materials and studies related to microaggressions are taken from Cheng et al. (in press), and appear in Chapters I, III and V. Stereotype threat studies and background information are taken from Rios et al. (2015) and are included in Chapters I, VI, and V. More information about the contributions of each author is located at the beginning of Chapters III and IV.

CHAPTER II

STUDY 1: EXPLICIT AND IMPLICIT ATTITUDES ASSOCIATED WITH RELIGION AND INTELLIGENCE

Introduction

There have been numerous studies examining the relationship between religiosity and intelligence, but what are people's actual perceptions about the intelligence of religious believers? In a recent meta-analysis of 63 studies, Zuckerman and colleagues (2013) found a negative correlation (r = -.16) between religiosity and performance on various intelligence measures (Zuckerman, Silverman, & Hall, 2013). Prior to this work, Lynn and colleagues (2009) found that atheists tend to score higher on IQ tests than theists, and that disbelief in God is positively correlated with national IQ in 137 countries (Lynn, Harvey, & Nyborg, 2009). Aside from IQ performance differences, Lynn and colleagues (2009) argued that additional evidence for the negative relationship between religiosity and intelligence includes 1) lower rates of religious beliefs among scholars and scientists compared to the general population, 2) a decrease in religious belief as children advance into late adolescence during which there is a simultaneous increase in cognitive ability, and 3) a general decline in religious belief among the college and general population as the intelligence level of populations has increased in the last century (Lynn et al., 2009).

Zuckerman and colleagues (2013) proposed that religious believers perform more poorly on IQ measures because intelligence and cognitive measures require more analytical thinking. Shenhav and colleagues (2012) found that those who engage in intuitive thinking tend to be more religious; they also found that using intuitive thinking

when solving problems positively predicts the strength of people's belief in God, and that experimentally inducing an intuitive mindset increases reported belief in God (Shenhav et al., 2012). Analytical thinking style, on the other hand, negatively predicts religious beliefs, in that those who engage in more analytical thinking report lower supernatural beliefs (Pennycook et al., 2012). Experimentally priming analytical thinking increases religious disbelief (Gervais & Norenzayan, 2012), although the opposite effect has not been found (i.e., religious beliefs have not been shown to suppress analytical thinking nor increase intuitive thinking). Because standardized tests such as the SAT and GRE require and test for analytical thinking, religious believers may be disadvantaged on these tests that influence access to higher education. Lower intelligence is strongly associated with religious fundamentalism and modestly associated with other dimensions of religiosity (Lewis, Ritchie, & Bates, 2011); thus poor intelligence performance may more strongly influence one segment (i.e., fundamentalists) of the religious population over another.

Even though there is a negative relationship between religion and intelligence performance, Zuckerman and colleagues (2013) did not find that there was a negative relationship between religiosity and GPA. This may be because, aside from intelligence, conscientiousness is the most important factor influencing academic attainment and achievement (Charlton, 2009). In a meta-analysis of religiosity and personality, Saroglou (2002) showed that religious individuals have higher levels of the personality trait conscientiousness than non-religious individuals (r = .18). Religion is shown to both enhance and replenish people's abilities to have self-control (Rounding, Lee, Jacobson & Li, 2011). Self-control and conscientiousness are predictive of a variety of positive

outcomes such as delayed gratification, better group performance and cooperation, and science achievement (Eilam, Zeidner, & Aharon, 2009; Rounding et al., 2011).

Although there have been numerous studies examining the relationship between religiosity and intelligence, there have been limited studies examining people's actual attitudes about the intellectual abilities of religious individuals. A large proportion of the American population identifies as being religious or having a belief in God (Gallup, 2016); thus, it is possible that they may hold more positive views about their own or other religious believers' intellectual ability due to in-group bias. On the other hand, because there is a lower rate of religiosity among faculty members and scientists (Ecklund & Scheitle, 2007; Gross & Simmons, 2009; Pew Research Center, 2009), scholars may perceive religious believers to have lower intelligence.

This is an important topic as studies have shown that people's beliefs about the intellectual ability of a group can affect performance. For example, telling female students that math abilities are genetically determined leads to poorer performance compared to women who are told that math ability is malleable (Dar-Nimrod & Heine, 2006). Even merely mentioning that intelligence is being measured can cause negatively stereotyped groups to perform poorly on tests (Steele & Aronson, 1995). Prior studies have also highlighted how teachers' expectations affect students' performance and motivation (Ferguson, 2003). In addition, people's negative attitudes about a group can lead to biased actions (Greenwald, Poehlman, Uhlmann, & Banaji, 2009). Because people's beliefs about the intellectual ability of a group can affect performance, it is important to investigate people's attitudes about the intelligence level of believers. It is also important to examine educators' beliefs about the intelligence of believers as their

attitudes may unconsciously affect their treatment of students.

In addition, because people tend to underreport or want to conceal biases that may be socially undesirable, it is important to go beyond self-report measures. The Implicit Association Task (IAT) is one such method and is commonly used to measure people's implicit associations (Greenwald & Banaji, 1995). The IAT is a well-validated psychological tool that uses participants' reaction times to measure implicit associations. The IAT measures the strength of association between two constructs relative to one another. For example, the "Good-Bad Insect versus Flowers" IAT can measure how people have stronger associations between "Flowers-Good" and "Insect-Bad" pairings relative to "Flowers-Bad" and "Insect-Good" pairings. If people have stronger associations between Flowers-Good or between Insect-Bad (or both), they would be quicker to sort the words associated with Flowers (e.g., Roses) and Good (e.g., beautiful) when these two constructs are paired together. Overall, examining people's both explicit and implicit attitude about religious believers' intelligence is important and may have consequences for believers' academic performance.

Method

Participants

The sample consisted of 899 participants and was somewhat equal among genders (56.6% female, 43.4% male) with a mean age of 31.13 (*SD* = 12.77) years. It was also predominantly European American (71% European American, 8.6% Latino American, 6.2% African American, 5.2% multiracial, 3.9% Asian American). A little over half identified with a religion (52.9%) while 35.7% did not. The religiously-affiliated participants consisted mainly of Protestant Christians (27.5%) and Catholic Christians

(17.2%), while the non-religiously affiliated participants consisted of Agnostics (19.9%) and Atheists (15.3%). I recruited participants from Amazon Mechanical Turk (mTurk) and from four comparable institutions of higher education. The higher education institutions were chosen based on two dimensions: location in states that differ in both political orientation and in religiosity (two Oregon versus two Texas universities) and religious affiliation (two secular versus two private Christian universities). These college samples allowed me to detect differences across both religiously affiliated and non-religiously affiliated universities and across different academic disciplines. Combining all these groups, the final sample consisted of 433 community members, 366 undergraduate and graduate students, and 74 faculty members (26 missing).

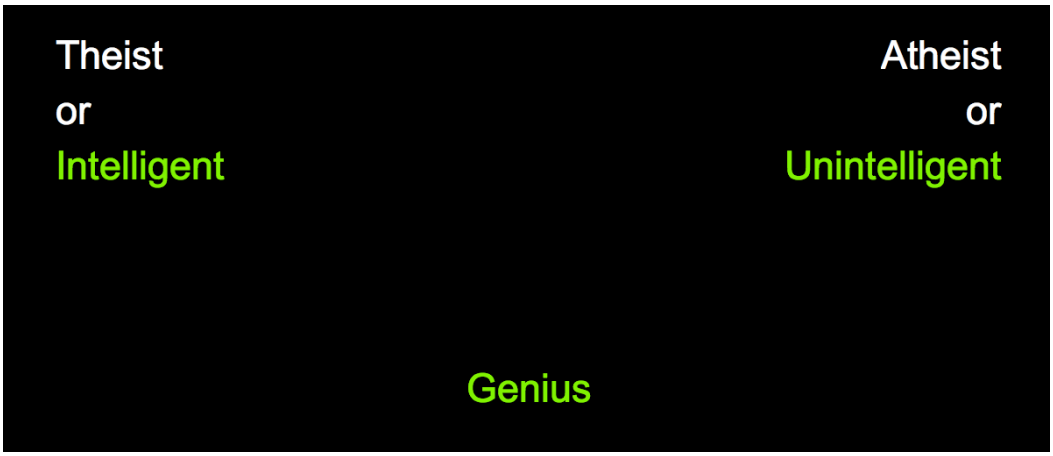
Measures

Explicit attitude. Using the Attitude Thermometer (Yancey, 2010), participants rated the intellectual ability of religious believers and atheists on a scale of 0 to 100 with higher ratings indicating greater intelligence.

Implicit attitude. Because people tend to underreport or conceal their biases, the use of the self-report Attitude Thermometer was supplemented with the Implicit Association Task (IAT; Greenwald & Banaji, 1995). For Study 1, I had participants categorize words associated with each construct to examine how they associated Theists (versus Atheists) with Intelligence (versus Unintelligence). Stimulus words used in the IAT were derived from a pilot study in which mTurk participants (n = 22) rated a list of synonyms for the construct categories (theist, atheist, intelligent, unintelligent). The five highest rated words from each category were used in the IAT (see Appendix A). I used "Millisecond" software to program and conduct the IAT.

The IAT score (the d score) ranges from -1 to 1 and was calculated so that it measured the strength of participants' reaction times on "Theist-Intelligence" and "Atheist-Unintelligence" pairings relative to "Atheist-Intelligence" and "Theist-Unintelligent" pairings (see Figure 1). Thus, participants holding stronger associations between Theist-Intelligence or between Atheist-Unintelligence (or both) would be quicker to sort the words associated with the categories Theist (e.g., believer) and intelligence (e.g., smart) when these two constructs are paired together and have a positive d score. The closer the d value is to 1, the stronger the association between Theist-Intelligence (or Atheist-Unintelligence).

Figure 1. Example of the Implicit Association Task.



Religiosity and demographics. Other dependent measures included an intrinsic/extrinsic religiosity scale (Gorsuch & McPherson, 1989) and measures of basic demographics.

Results

Explicit Attitudes

General results. Using one sample t-tests comparing people's ratings to the midpoint of the scale (i.e., 50), I found that participants rated all target groups [i.e.,

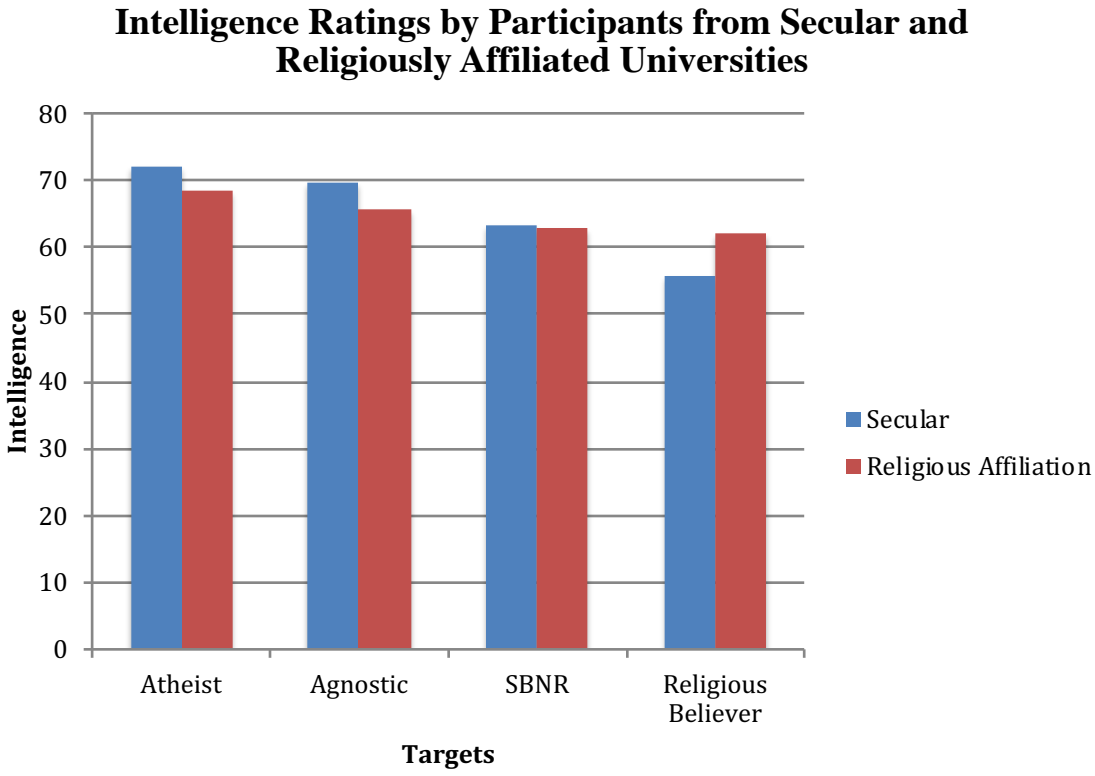
atheist, agnostic, spiritual but not religious (SBNR), and religious believer] to be above the midpoint in intelligence (all p's < .001). Using multiple paired t-tests, I found that the intelligence ratings of the target decreased with the religiosity of the target. Participants rated the atheist target (M = 71.12, SD = 19.93) to be more intelligent than the agnostic target (M = 69.16, SD = 18.15; t(898)=3.45, p < .001); the agnostic target to be more intelligent than the SBNR target (M = 65.71, SD = 19.35; t(898) = 4.96, p < .001); and the SBNR target more intelligent than the religious believer target (M = 57.50, SD = 20.95; t(898) = 10.45, p < .001).

Religious versus secular universities. Because I was interested in examining how academia impacts the intellectual rating of the targets, I examined how university religious affiliation, study discipline, and academic exposure affected participants' perception of the intelligence of the targets. For all these analyses, I controlled for participants' intrinsic/extrinsic religiosity. For religious affiliation, I found no significant main effect of the religiosity of the target, but there was a significant interaction between the religiosity of the target and the religious affiliation of the school. This suggests that participants from religious and secular academic institutions are rating the intelligence level of the different targets differently, F(2.46, 785.45) = 8.51, p < .001. The partial eta squared (n_p^2 = .03) was of small size (n_p^2 = .01 is small; n_p^2 = .06 is medium, and n_p^2 = .14 is large).

Using pairwise comparisons with Bonferroni correction, I found that participants from secular institutions perceived all non-religious target groups to have higher intelligence than the religious target (all ps < .001), while participants from religiously affiliated universities only perceived the atheist target to have significantly higher

intelligence than the religious believer target (p = .02). I also compared how participants from secular versus religiously-affiliated universities rated each target, and found that participants from secular universities rated the agnostic target to have higher intelligence (p = .03) and the religious believer target to have lower intelligence (p = .004) than those from religiously affiliated universities (see Figure 2).

Figure 2. Explicit intelligence ratings by religious and non-religiously affiliated university participants.



Academic disciplines. I divided the student and faculty participants into humanities, social sciences and life/hard sciences to examine the effect of academic disciplines on intelligence ratings. I found a significant main effect of the religiosity of the target, $F(2.45, 995.23) = 4.61, p < .01$, $\eta_p^2 = .01$. Using simple within-subject contrasts, I found that participants rated all the non-religious targets to have higher

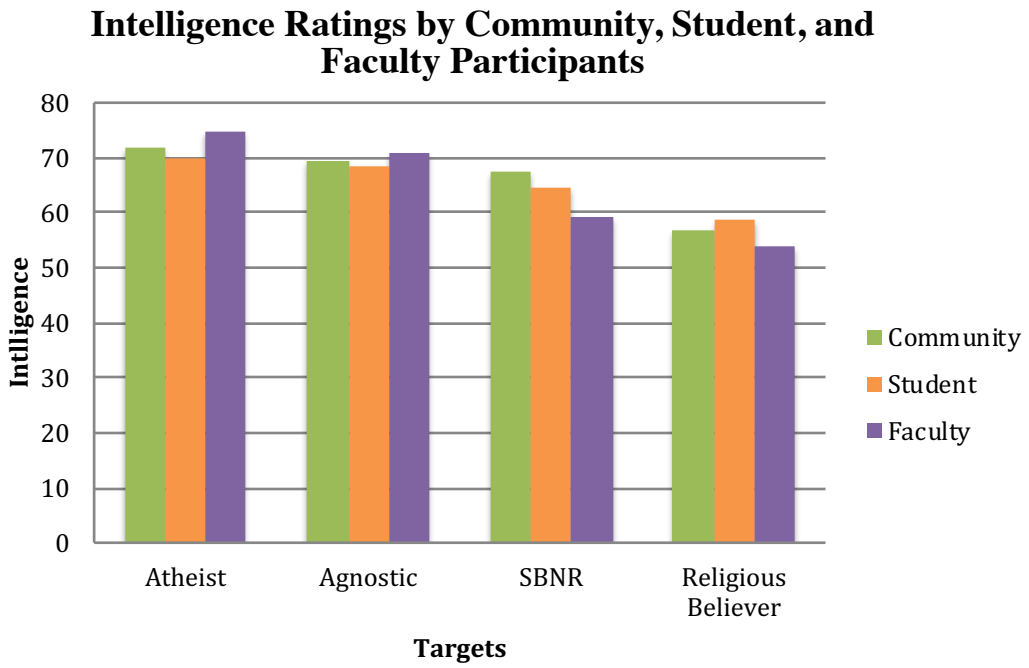
intelligence than the religious target (all p's < .01, n_p^2= .01- .03). There was no interaction between the religiosity of target and academic discipline.

Academic exposure. Since I was interested in seeing whether academic exposure would affect intellectual ratings, I divided the sample into faculty (i.e., longest exposure to academia), students (who are in an academic setting) and community members. I found a significant main effect of the religiosity of the target in which participants' intelligence ratings differed by the religiosity of the target, $F(2.36, 2050.57) = 16.70$, $p < .001$, $n_p^2 = .02$. Using simple within-subjects contrasts, I again found that participants rated all the non-religious targets to have higher intelligence than the religious target (all p's < .001, n_p^2= .03- .04). There was also a significant interaction between the religiosity of the target and academic exposure of participants, suggesting community versus student versus faculty rated the intelligence level of the different targets differently, $F(4.72, 2050.57) = 4.50$, $p < .001$, $n_p^2 = .01$.

Using pairwise comparison test with Bonferroni corrections, I found both the community and student participants rated each of the non-religious targets to have higher intelligence than the religious target (all $p < .001$). Faculty showed a similar trend in which they also rated the atheist and agnostic targets as having higher intelligence than the religious target (p's < .001); however, their rating of the SBNR target was not significantly different from the religious target ($p > .21$). When examining how each group rated the targets differently, I found that faculty gave the SBNR target a lower intelligent rating compared to community participants ($p = .002$) and students (marginal significance: $p = .07$), but there were no significant differences among the community,

students and faculty in how they rated the atheist, agnostic and religious believer targets (see Figure 3).

Figure 3. Explicit intelligence ratings divided by academic exposure.



Implicit Attitudes

Group differences.

***Religious versus secular universities*.** Using univariate ANCOVA controlling for participants' intrinsic/extrinsic religiosity, I found participants from religiously affiliated universities had significantly stronger implicit associations between theists and intelligence than non-religious participants, $F(1,320) = -11.06$, $p < .001$, $n_p^2 = .03$ (see Table 1 for *d* values).

Academic disciplines. I found no differences among the disciplines for the implicit association between theists and intelligence.

Community participants versus students versus faculty. There was a significant main effect of academic exposure, $F(2, 873)= 10.10$, $p < .001$, $n_p^2 = .02$. Simple effects tests with faculty as the comparison group showed that both community members and students had a significantly stronger positive associations between theists and intelligence compared to faculty (p's < .001).

Preferences

Implicit preferences. Using one sample t-tests, I compared participants' *d* scores against 0, which would indicate whether people were more likely to associate theist with intelligence (or atheist with unintelligence) or theist with unintelligence (or atheist with intelligence). In contrast to what I found for participants' explicit intelligence ratings, the majority of groups implicitly associated theists with intelligence. One of the exceptions was that some faculty groups had no preference for either association (see Table 1 for a summary of all *d* score comparisons against 0 for all interested sample groups).

Implicit and explicit preferences correlations. Because of the discrepancy between participants' explicit and implicit associations between religion and intelligence, I examined the strength of the correlation between these two attitudes. To compute an explicit attitude preference score that was more parallel to the *d* score for implicit attitudes, I calculated participants' explicit intelligence preference by subtracting their intelligence ratings of the atheist from the intelligence rating of the religious believer. Thus, a negative number indicates that the participant holds the explicit attitude that atheists have a higher level of intelligence than religious believers. Using one sample t-tests, I compared participants' explicit intelligence preference against 0 and found that all groups are explicitly indicating that they believe religious believers to have lower

intelligence than atheists. When examining the relationship between participants' explicit and implicit intelligence preferences, in general, I found a significant correlation for all but one group: faculty. They fell on the extremes where religiously affiliated university faculty had no significant correlation between their implicit and explicit intelligence preference, while faculty members at secular universities had the strongest correlation (see Table 1).

Table 1

Implicit and Explicit Intelligence Preferences and Correlations

Samples	***Implicit Intelligence Preference***	***Explicit Intelligence Preference***	***Explicit and Implicit Preference Correlations***
All participants	0.50 (.54)***	-13.61 (26.67)***	.38***
University Affiliation:			
Religious	0.66 (.42)***	-5.09 (20.33)**	.35***
Secular	0.41 (.55)***	-17.25 (26.76)***	.37***
Academic Discipline:			
Humanities	0.47 (.55)***	-13.80 (27.85)***	.35***
Social Sciences	0.54 (.50)***	-12.82 (26.27)***	.32***
Life/Hard Sciences	0.45 (.53)***	-12.95(24.63)***	.45***
Academic Exposure:			
Community Members	0.52 (.54)***	-14.15 (32.51)***	.42***
University Students	0.54 (.50)***	-11.82 (26.57)***	.34***
Faculty	0.27 (.53)***	-20.57 (24.58)***	.42***
Faculty:			
Religious Affiliation	.51 (.38)***	-16.18 (18.01)***	.06
Secular	.14 (.56)†	-21.04 (23.05)***	.48***

Note. Means (and standard deviation) of *d* scores and for the explicit intelligence preferences are reported. Symbols indicate significance levels († at $p < .10$, * at $p < .05$, ** at $p < .01$, *** at $p < .001$).

Discussion

The main purpose of Study 1 was to examine people's explicit and implicit associations between intelligence and the religiosity of individuals. I was also particularly interested in seeing how academic settings, disciplines, and academic exposures affect

these associations. Looking across all participants, participants typically explicitly reported that people's intelligence level decreases with higher religiosity and reported that religious believers had lower intelligence levels compared to atheists. In terms of group differences, faculty and students from secular universities were significantly more likely than those from religiously affiliated university to associate people with higher religiosity with lower intelligence.

There were no differences across disciplines for explicit ratings of intelligence. There were similarities in how faculty, students, and community members rated the intelligence level of targets except for the SBNR target. Faculty members were significantly more likely than students and community members to rate the SBNR target as having lower intelligence and made no distinction between the intelligence level of SBNR and religious believers.

For implicit attitudes, participants generally associated intelligence with those who believe in God (theists), although the strengths of these associations varied depending on the academic affiliation and exposure of individuals. Faculty and students from secular institutions were less likely than those from religiously affiliated universities to associate theists with intelligence. In addition, faculty members were significantly less likely than students and community members to implicitly associate theists with intelligence. Although most participants implicitly associated theists with intelligence, faculty members from secular institutions did not. They equally associated theists and atheists with intelligence, showing no implicit preference for one or the other.

Overall, participants' explicit and implicit attitudes appear to contradict one another although they are generally significantly correlated with one another. While all

groups explicitly report perceiving religious believers to have lower intelligence compared to atheists, they are more likely to implicitly associate believers with intelligence than they to implicitly associate atheists with intelligence. A meta-analysis of 126 studies found an effect size of 0.24 between explicit self-report measures and the IAT, suggesting a small correlation between people's explicit and implicit attitudes (Hoffman, Gawronski, Gschwendner, Le, & Schmitt, 2005). In addition, other prior studies have found discrepancies between implicit and explicit attitudes (e.g., Olson, Fazio & Hermann, 2007; Soo Hing, Chung-Yan, Grunfeld, Robichaud, & Zanna, 2005). While some researchers have proposed that the discrepancy between explicit and implicit scores implies ambivalence or conflicting evaluations, Smith and Nosek (2012) found that the explicit-implicit discrepancy is not related to ambivalence measures nor does it predict ambivalence-related outcomes.

Rather, studies have shown that the IAT may simply reflect societal, cultural and/or extrapersonal associations instead of personal beliefs (Han, Czellar, Olsen, & Fazio, 2010; Karpinski & Hilton, 2001). Thus, the finding that people implicitly associate religion with intelligence may be reflective of a halo effect of religion or a reverse halo effect of atheism. In America, religiosity is often assumed to signal morality and, in particular, trustworthiness (Edgell et al., 2006; Tan & Vogel, 2008). Therefore, because religion tends to be associated with positive traits in the American culture, people implicitly associate intelligence with religion, suggesting a halo effect of religion.

As the IAT's *d* score is reflective of different associations (i.e., a positive *d* score can be the association between religion with intelligence and/or atheism with unintelligence), it is also possible that people's implicit associations reflect the negative

connotation of atheism/non-religiosity. Prior studies show that atheists are among the least trusted and liked people in America (Gallup, 2012; Gervais, Shariff, & Norenzayan, 2011; Yancey, 2010), and those who identify as having no religious affiliation are perceived to lack morals, even if they do not specifically identify as agnostic or atheist (Hood, Spilka, Hunsberger & Gorsuch, 1996). Therefore, it is possible that people's implicit association between religion and intelligence is due to the reverse halo effect of atheism, and/or a combination of both the halo and reverse halo effect.

Although religion may have a positive association in the general American culture, academia may reflect different values. The implicit data shows that participants from secular institutions were significantly less likely than those from religiously affiliated universities to associate theists with intelligence. Faculty members also were significantly less likely than students and community members to associate theists with intelligence. As universities tend to be more secular with professors being less religious and more non-religious than the general American population (Gross & Simmons, 2009; Pew Research Center, 2009), it is no surprise to see a decrease in the association between religion and intelligence. In addition, faculty members from secular institutions had no implicit intelligence preference for theists or atheists and had the strongest congruity between their explicit and implicit intelligence preferences. This may be explained by faculty members having the longest exposure to academia and being more insulated from the halo effect of religion and being more exposed to anti-religious messages. Faculty members at religiously affiliated universities showed no significant correlation between their explicit and implicit intelligence preference. This may reflect the opposing effect that exposure to academia and being embedded in a religious context may have on one

another. Overall, group differences found in the implicit ratings and in the correlation between explicit and implicit intelligence preference correlations suggest that the implicit data measures more societal associations than personal beliefs.

Future Direction and Next Phase

While participants' implicit associations may reflect cultural associations and the effect sizes are small, prior studies show that they have predictive validity; thus, it is important to investigate how people's explicit and implicit associations may affect their behaviors. In a meta-analysis of 122 studies, Greenwald and colleagues (2009) found that people's IAT scores have $r = .27$ for behavioral predictability, while explicit measures have a predictive validity of $r = .36$ (Greenwald et al., 2009). Although self-report measures tend to have higher predictive validity, Greenwald and colleagues (2009) found that explicit and implicit attitudes have incremental validity, suggesting that they have predictive power that is independent of one another.

Because both explicit and implicit attitudes have predictive power, it is unclear how the discrepancy found between participants' explicit and implicit attitudes would impact their behavior towards religious and non-religious individuals. Are religious individuals more likely to receive explicit forms of bias than more subtle forms? Are religious individuals more shielded from bias in the general American public because of the halo effect of religion and the reverse halo effect of atheism? Is academia still a safe haven for non-believers as people's implicit preferences may affect non-religious individuals negatively? While these are all important questions to examine, I will focus on the first two questions in the next research phase to see how religious individuals perceive and experience religious bias inside and outside of academia. Specifically, I will

examine whether religious prejudice is communicated in the form of microaggressions versus overt discrimination, and if there are differences in rates religious prejudice depending on the academic context.

CHAPTER III

STUDIES 2-3: RELIGIOUS MICROAGGRESSIONS, DISCRIMINATION AND MENTAL HEALTH OUTCOMES

This chapter contains materials from:

Cheng, Z.H, Pagano, L. & Shariff, A. (in press). The development and validation of Microaggressions Against Religious Individuals Scale (MARIS). *Psychology of Religion and Spirituality*.

Azim Shariff was the principal investigator for the studies. Louis Pagano helped in conducting the data analysis to develop the microaggressions scale (MARIS). I primarily conducted the data analysis and the writings included in this chapter.

Introduction

Microaggressions are subtle and commonplace remarks or actions that people may experience as demeaning, prejudicial, and negating (Sue, Capodilupo et al., 2007). The theory of microaggressions—first proposed by Pierce, Carew, Pierce-Gonzalez, and Wills (1977)—was further developed by Sue (Sue, Capodilupo et al., 2007; Sue, 2010a; Sue, 2010b), and it is an emerging area of inquiry in the psychology of prejudice. Because early research on microaggressions focused on race, there are several developed racial microaggressions scales and taxonomies developed for ethnic minorities (e.g. Nadal, 2011; Torres-Harding, Andrade & Romero-Diaz, 2012). Examples of racial microaggressions include complimenting Asian Americans on their English fluency or complimenting African Americans on how articulate they sound (Tran & Lee, 2014).

While these questions and comments may be well intended, the messages that are communicated (i.e., you are a foreigner or should be less intelligent because of your race) are prejudicial.

In addition to general racial microaggressions scales, microaggressions themes and measures have been developed for specific racial groups such as African Americans, Asian Americans, and Hispanic Americans in order to highlight the unique forms of microaggressions that these racial groups experience (Constantine & Sue, 2007; Ong, Burrow, Fuller-Rowell, Ja & Sue, 2013; Sue, Capodilupo et al., 2007; 2008). Researchers have also examined other forms of microaggressions, including those experienced by women and sexual minorities (e.g., Balsam, Molina, Beadnell, Simoni, & Walters, 2011; Capodilupo, Nadal, Corman, Hamit, Lyons, & Weinberg, 2010; Nadal, Issa, Leon, Meterko, Wideman & Wong, 2011).

To date, only one study has examined religious microaggressions (Nadal, Griffin, Hamit, Leon, Tobio, & Rivera, 2012). Nadal and colleagues (2012) conducted a qualitative study on Muslim Americans' experiences with microaggressions. However, because this study was small (n = 10) and only focused on a single group, a more extensive examination of religious microaggressions is needed. Nadal and colleagues (2010) also proposed that religious minorities may encounter higher rates of microaggressions than Christians as they are also more likely to experience religious discrimination (Nadal, Issa, Griffin, Hamit & Lyons, 2010). However, prior research shows that, in certain contexts, Christians can encounter as much bias as other minority groups—or even more than other groups (e.g., Gartner, 1986; Hyers & Hyers, 2008; Yancey, 2011). Therefore, more research is needed to understand how religious minority

groups experience microaggressions compared to majority groups. Overall, religious microaggressions research would benefit from a more extensive examination with a larger sample size including different religious groups.

Microaggressions differ from overt discrimination in that they tend to occur more frequently and in everyday interactions (Nadal, 2011). Thus, studying religious microaggressions in addition to overt discrimination can provide a more holistic picture of how religious individuals experience prejudice. Moreover, prior research has found that people experience greater cognitive impairments when encountering ambiguous prejudice than overt racism (Salvatore & Shelton, 2007). Similarly, microaggressions theorists propose that although microaggressions are subtler forms of prejudice, their frequency can create a negative cumulative psychological effect—"death by a thousand cuts" (Nadal et al., 2011).

Indeed, Nadal and colleagues (2014) found that experiences of racial microaggressions predicted greater depressive symptoms (Nadal, Griffin, Wong, Hamit, & Rasmus, 2014), and Torres and colleagues (2010) found that experiences of microaggressions were related to greater perceived stress at one-year follow-up (Torres, Driscoll, & Burrow, 2010). However, these studies do not measure or control for discrimination. Because prior meta-analyses have found discrimination to have a small but significant negative relationship (r = -.17 to -.22) with mental health (e.g., depressive symptoms) and general well being (e.g., perceived stress; Pascoe & Smart Richman, 2009), it is unclear whether microaggressions independently predict poorer mental health. Thus, it is important to examine subtle acts of prejudice like microaggressions alongside

overt discrimination in order to understand how each uniquely relates to mental health outcomes.

Study 2

Method

Inclusion Criteria and Participants. Participants were those who self-identified as being religious and reported a belief in a God or god(s) or followed a particular religious figure (e.g., Buddha). In an effort to recruit a religiously diverse sample, I recruited participants via Qualtrics Panel. The sample of 383 participants was predominantly female (74.2%) with an average age of 24.71 years. About half of the participants were Christian (53.5%), with the others being 12.5% Buddhist, 10.4% Muslim, 9.9% Hindu, 8.4% Jewish, and 5.2% other. The majority of Christians consisted of Catholics (36.2%), those without a denomination (20.6%), and Baptists (20.1%). Of those who identified as Muslims, the majority (81.1%) identified with the Sunni denomination, 10.8% with the Shiite denomination, and 2.7% with the Sufi denomination. The sample was ethnically diverse with 48.2% European American, 22.7% Asian American, Hawaiian or Pacific Islander, 11.5% African American, 8.4% Hispanic American, 3.4% Middle Easterner, 2.6% American Indian or Alaskan Native, 2.3% other, and 1% chose not to answer. More than half of the participants were current college and post-college students (61.6%).

Measures.

Microaggressions Against Religious Individual Scale (MARIS). MARIS is a three-factor (*Assumption of Inferiority, Religious Stereotyping,* and *Assumption of Non-religiosity*) 10-item scale that measures microaggressions experienced by religious

individuals (Cheng, Pagano, & Shariff, in press; see Appendix). The *Assumption of Inferiority* factor (α = .90) contains four items that measure religious individuals' experiences with other people assuming that the religious individuals are less educated, competent, or successful because of their religion. My colleagues and I (Cheng et al., in press) found that the subscale *Assumption of Inferiority* explained the greatest variance in the MARIS.

The *Religious Stereotypes* factor (α = .89) includes three items that measure the extent to which people assume religious individuals are close-minded and judgmental toward various groups. The *Assumption of Non-religiosity* factor (α = .85) contains microaggressive items measuring the extent to which people wrongly assume that religious individuals do not believe in God(s) or attend places of worship. The overall scale has a high level of internal consistency (α = .93), variance, and construct validity (Cheng et al., in press). Participants in this study indicated how often they experienced these microaggressions items inside and outside of an academic setting during a typical school year using the following scale: 1 = *Never,* 2 = *1-3 times*, 3 = *4-6 times*, 4 = *7-9 times*, 5 = *10 or more times*.

General Religious Discriminatory Scale (GRDS). I adapted the original 14-item general discriminatory scale from Sheridan (2006), which explored Muslims' discriminatory experiences (*N* = 222), to be used for multiple religious groups. The original 14-item scale demonstrated a strong internal consistency (above .90) and was validated using the General Health Questionnaire-12, a measure of overall mental health. Our modified scale (α = .94) contained scale items that measure the direct experience or observation of religious discrimination in three ways: (a) observing negative stereotypes

of one's religious group in the media, (b) witnessing prejudiced political and violent activities toward religious individuals, and (c) seeing religious discrimination or prejudice. Respondents identified the frequency of these experiences with responses ranging from 0 (*never*) to 4 (*very often*).

Center for Epidemiologic Studies Depression Scale-Revised. The Center for Epidemiologic Studies Depression Scale- Revised (CESD-R) is a 20-item scale used to evaluate symptoms associated with a major depressive episode. Symptom incidence is evaluated on a 5-point Likert scale (0 = *not at all or less than one day*; 5 = *5-7 days* or *nearly every day for 2 weeks*). The original scale had a high level of internal consistency (α = .92) and generally strong psychometric properties with a very large community sample (Van Dam & Earleywine, 2011). This measure is considered to be one of the most widely used instruments in the field of psychological epidemiology (see Murphy, 2002).

Big Five Inventory-Neuroticism (BFI-N). The BFI-N contains eight items taken from the original BFI (John & Srivastava, 1999). These items were used to assess a participant's trait of Neuroticism. Respondents indicate their agreement to statements describing certain personality traits using a 5-point Likert scale (1 = *Disagree Strongly*; 5 = *Agree Strongly*). The BFI-N subscale has demonstrated an internal consistency α of .84. It also has had adequate convergent and divergent validity with other common personality measures including the Trait Descriptive Adjectives (Goldberg, 1992) and NEO Personality Inventory (Costa & McCrae, 1992).

Demographics questionnaire. Respondents were asked to provide basic demographic information including their age, gender, and religion. If respondents

identified as Christian or Muslim, they were given multiple denominational options to select.

Results

Academic differences in microaggressions and discrimination. Using independent samples *t*-tests, I found that current university students (M = 17.86, SD = 8.39) reported significantly higher rates of religious microaggressions than non-students (M = 14.84, SD = 6.38), $t(357.32) = -3.95$, $p < .001$. The partial eta squared (η_p^2 = .03) was of small size (η_p^2 = .01 is small; η_p^2 = .06 is medium, and η_p^2 = .14 is large). The Cohen's d was of medium size (d = .4) (d = .2 is small, d = .5 is medium and d = .8 is large). For religious discrimination, current students (M = 40.60, SD = 14.26) also reported significantly higher rates of religious discrimination than non-students (M = 36.39, SD = 13.25), $t(310.84) = -2.87$, $p < .01$, d = .31. These results held even after controlling for participants' age and ethnicity.

Group differences in microaggressions and discrimination. One important distinction in this study population was between Christians, who are part of the national religious majority, and non-Christians, who all part of minority religious groups in the United States. I conducted independent samples t-tests to examine to what degree these groups differed on rates of microaggressions and discrimination. I found that those who identified with a minority religion (M = 18.37, SD = 8.76) reported significantly higher rates of religious microaggressions than Christians (M = 15.17, SD = 6.61), $t(365) = -3.99$, $p < .001$, although their experiences of religious discrimination (M = 40.29, SD = 15.32) only differed marginally from those reported by Christians (M = 37.41, SD = 13.21), $t(365) = -1.90$, $p = .06$ (see Table 2).

Table 2

Religious Group Differences

	Religious Microaggressions	Religious Discrimination
Buddhists (*n* = 47)	20.78(9.38)	42.68(15.87)
Christians (*n* = 201)	15.17(6.61)	37.41 (13.21)
Hindus (*n* = 36)	17.61(7.74)	34.33(14.80)
Jews (*n* = 31)	14.80 (6.79)	40.00 (14.07)
Muslims (*n* = 39)	19.09 (9.75)	42.49 (15.71)

Note. Means (and standard deviation) are reported for each religious group. The smallest sample size for each analysis is reported above.

Microaggressions, discrimination, and depression. Prior research has highlighted the relationship among experiences of discrimination, microaggressions, and poorer mental health. Without controlling for any variables, all of the MARIS factors and the overall experience of religious microaggressions were related to higher levels of depression (see Model 1 in Table 3). I used hierarchical linear regression to examine how the overall experience of religious microaggressions uniquely predicts mental health outcomes. After controlling for neuroticism and demographic variables (Model 2), I found a significant relationship between religious microaggressions and depressive symptoms. The significant relationship with depressive symptoms held even after controlling for religious discrimination (Model 3), showing that both religious microaggressions and religious discrimination uniquely predict depression.

Table 3

Incremental Validity of Religious Microaggressions on Depression

	Model 1		*Model 2*		*Model 3*	
Variable	B	β	B	β	B	β
MARIS	0.71	.49***	.61	.42***	.53	.37***
Gender			-1.41	-.06	-1.37	-.05
Ethnicity			1.60	.07	1.67	.07
Neuroticism			.74	.37***	.72	.36***
Religious Discrimination					.09	.12*
R^2	.24		.37		.38	
F for R^2 change	115.10***		23.96***		5.78*	

Note. Regression results are presented with and without covariates with standardized and unstandardized beta weights for depression and perceived stress. Asterisks indicate significance levels (* at $p < .05$, ** at $p < .01$, *** at $p < .001$). In Model 2, I controlled for gender (1= male, 2= female), ethnicity (1= European Americans, 2= ethnic minorities), and neuroticism. In Model 3, I included religious discrimination in addition to the variables controlled in Model 2.

Study 3

Method

Inclusion criteria and participants. For Study 3, I was interested in seeing how current university students experience religious bias, and whether there were differences in the rates of religious bias inside and outside of the academic context, taking into account time spent in each setting. Thus, participants were limited to students attending secular universities who reported believing in a God or God(s) or followed a particular

religious figure (e.g., Buddha), and self-identified as being religious. Those who failed the written attention check question (n = 38) were also excluded. The final mTurk sample consisted of 129 participants (57.4% male, 42.6% female) with a mean age of 27.5 years.

The majority of participants identified as Christians (99.2% Christian; .8% Sunni Muslim). Of those who indicated their denomination, the majority of Christians identified as Catholics (39.5%), Baptists (17.1%) and those without a denomination (13.2%). The sample was somewhat diverse: 63.6% European American; 14.0% African American; 10.1% Hispanic American; 7% Asian American, Hawaiian or Pacific Islander; 1.6% Middle Easterner; 0.8% American Indian or Alaskan Native; and 3.1% chose not to answer. The sample consisted of both graduate and undergraduate students (30.2% seniors, 27.9% graduate students, 23.3% juniors, 10.9% sophomores, 7% freshman, and .8% other) in a variety of disciplines [24.8% in social sciences, 30.2% in non-sciences (including law), and 45.0% in STEM fields (including health fields)].

Measures.

Religious bias measures. Similar to Study 2, both the MARIS and the GRDS were administered. Participants indicated how often they experienced microaggressions and discriminatory incidences inside and outside of an academic setting during a typical school year. A sum of inside and outside incidences was used to calculate the overall rates of religious microaggressions and discrimination. Participants also indicated what percentage of time they spent inside versus outside of an academic setting, which was used to weight how often religious bias occurred inside and outside of academia. For example, a student may indicate a total of ten microaggressions for inside of academia and ten incidences outside of academia, and that they spent 40 percent of time inside of

academia and 60 percent of time outside. Even though this student had the same total number of microaggressive incidences inside and outside of academia, the microaggressions experienced inside of academia would be weighted more heavily (i.e., it would be calculated as 6 incidences) than microaggressions experienced outside of academia (calculated as 4 incidences). This is to take into account that this student spent less time inside of academia but yet experienced the same number of microaggressive incidences outside of academia. Because of these changes in the number of microaggressive incidences, I will only report the *p* values and effect sizes instead of means of microaggressive incidences.

Depression and neuroticism. The CESD-R was again administered to measure depression. Participants indicated depression symptoms they experienced during the past week on a 4-point Likert scale (0 = *rarely or none of the time*; 4 = *most or almost all the time*). The eight-item BFI-N (John & Srivastava, 1999) was again used to measure neuroticism.

Demographics questionnaire. Respondents were again asked to provide basic demographic information including their age, gender, and religion. If respondents identified as Christian or Muslim, they were given multiple denominational options to select. In addition, students were asked about their major and year in school.

Results

Academic differences in microaggressions and discrimination. Using pairwise *t*-tests, I found that university students reported experiencing significantly higher rates of religious discrimination inside of academia than outside. This was also true for the

overall experience of religious microaggressions and for each of the religious microaggressions factors (see Table 4).

Table 4

Inside and Outside Academia Bias Comparisons

	t value	*p* value	Cohen's *d* value
Religious Discrimination (*n* = 128)	3.02	.003	.37
Religious Microaggressions (*n* = 129)	3.37	.001	.42
Assumption of Inferiority (*n* = 129)	2.97	.004	.35
Religious Stereotyping (*n* = 129)	2.92	.004	.33
Assumption of Non-religiosity (*n* = 129)	3.39	< .001	.43

Note. *T*, *p* and Cohen's *d* values are reported for each pairwise t-tests.

Group differences. I used univariate ANCOVA controlling for participants' age and ethnicity to examine group differences. Compared to graduate students, undergraduates reported experiencing significantly higher rates of religious discrimination inside of academia, $F(1,119) = 4.72$, $p = .03$, $\eta_p^2 = .04$. There were no other significant differences between undergraduates and graduate students for their experience of religious microaggressions.

I also found a significant main effect of academic disciplines on the overall experience of religious microaggressions, $F(2, 118) = 3.17$, $p < .05$, $\eta_p^2 = .05$. Using simple effects test with Bonferroni correction, I found that social science students reported significantly higher rates of religious microaggressions than those in the non-sciences, $p < .05$, $d = .64$. In particular, there was a significant main effect of disciplines on *Assumption of Non-religiosity*, $F(2, 118) = 5.41$, $p < .01$, $\eta_p^2 = .08$. Using simple

effects tests, I found that social science students reported significantly more incidences of being assumed to be non-religious than those in the non-sciences, $p < .01$, $d = .75$. Social science students reported marginally more incidences of being non-religious than those in the STEM fields, $p < .01$, $d = .75$. In addition, there was a marginally significant effect of *Assumption of Inferiority*, $F(2,118) = 2.77$, $p = .07$, $n_p^2 = .05$. Social science students reported significantly more incidences of being assumed to have inferior work than those in the non-sciences, $p = .03$, $d = .60$. There were no other significant differences among different disciplines for participants' experience of religious discrimination.

Microaggressions, discrimination, and depression. Using hierarchical linear regressions, I examined if religious microaggressions and discrimination would again uniquely predict depression. Without controlling for any variables, the overall experience of religious microaggressions was related to higher levels of depression (see Model 1 in Table 5). After controlling for neuroticism and demographic variables (Model 2), there was still a significant relationship between religious microaggressions and depressive symptoms. However, the relationship between religious microaggressions and depressive symptoms became marginal ($p = .09$) when religious discrimination was added (Model 3). Religious discrimination was found not to significantly predict depression.

Table 5

Religious Microaggressions and Discrimination in Predicting Depression

	Model 1		*Model 2*		*Model 3*	
Variable	B	β	B	β	B	β
MARIS	0.01	.39***	.00	.26**	.00	.21†
Gender			.58	.03	.54	.03

Ethnicity		.81	.04	.82	.04
Neuroticism		1.00	.41***	1.00	.41***
Religious Discrimination				.00	.06
R^2	.15	.29		.28	
F for R^2 change	21.77***	9.06***		.001	

Note. Regression results are presented with and without covariates with standardized and unstandardized beta weights for depression. Symbols indicate significance levels († at $p < .10$, * at $p < .05$, ** at $p < .01$, *** at $p < .001$). In Model 2, I controlled for gender (1=male, 2=female), ethnicity (1= European Americans, 2= ethnic minorities), and neuroticism. In Model 3, I controlled for religious discrimination in addition to the variables controlled in Model 2.

Discussion

The main purpose of Studies 2-3 was to examine religious believers' experience of religious microaggressions and discrimination in relation to academia and how these experiences affect mental health. Across both studies, I found that religious microaggressions and discrimination were more common in the university than outside of academia. In Study 2, students reported higher rates of both religious discrimination and microaggressions than non-students. In Study 3, university students reported encountering significantly more incidences of religious discrimination and microaggressions inside of academia than outside. Although the sample in Study 3 was not religiously diverse, Study 2 included a large number of religious minorities. Those who subscribed to minority religions reported encountering higher incidences of religious

microaggressions and discrimination than Christians, suggesting that academia is not a safe haven for all religious groups.

Past studies show that people tend to display prejudice against those who are ideologically different from them (e.g., Inbar & Lammers, 2012). Thus, one possible explanation for greater encounters with religious bias inside of academia is the tendency for professors to be more non-religious. Outside of academia, students may interact more with friends and family members who share similar ideologies and backgrounds. This may explain why undergraduate students reported experiencing more religious discrimination than graduate students as they may have been having more interactions with different faculty and students than graduate students.

In addition, the finding that social science students reported significantly more religious microaggressive experiences than those in other disciplines also reflects the non-religious demographics of social science faculty. Data on faculty's religiosity shows that social science professors tend to be the least religious faculty group. Social science professors have lower rates of belief in God (37.3% believe in the existence of God) than those in the physical and biological sciences and the humanities (41.5% for both groups; Gross & Simmons, 2009). Although humanities and physical and biological science professors have similar levels of belief in God, those in the social sciences are weaker in their certainty of the existence of God (24.7%) compared to those in the humanities (31.3%; Gross & Simmons, 2009). In addition, the highest number of atheist professors is in the social sciences (23.4% in social vs. 16.3% in the humanities), with psychology leading with the greatest number of atheist professors (50.0%; Gross & Simmons, 2009).

As a result of being more unfamiliar with or rejecting religion, social science faculty may enact more subtle religious bias towards students.

Although this is the case, it is possible that there are higher rates of religious bias inside of academia because students have greater numbers of social interactions inside of academia than outside. While I took into account time spent inside and outside of academia, future studies could also measure base-rate events of bias in both contexts as recent critics of microaggressions research have suggested (e.g., Lilienfeld, 2017). In addition, future studies should measure other forms of bias alongside religious bias. Past studies have found that religious university students document similar rates of religious bias as African American university students who report experiencing racial bias (Hyers, 2007; Hyers & Hyers, 2008). But because this past research did not distinguish between biases encountered inside and outside of academia, future studies should measure religious bias alongside other forms of bias inside and outside of academia to examine whether experiences of religious bias is uniquely higher inside of academia.

Clinical Implications

I found that religious microaggressions and discrimination significantly and uniquely predicted depressive symptoms in Study 2, and religious microaggressions marginally predicted depression in Study 3. The effects were of small to medium size, which is consistent with the growing research base showing the negative relationship between experiences of prejudice and well being (Pascoe & Smart Richman, 2009). One of the main limitations of these studies—the present research included—is that these findings are correlational in nature, leaving open several (not mutually incompatible) causal explanations. For one, the associations may be explained by a third variable

causally responsible for both the experience of microaggressions and of depressive symptoms. I controlled for possible candidates such as basic demographics and neuroticism, but other variables may be involved.

Another possible causal pathway is that those who are depressed may be more likely to interpret neutral interactions as microaggressions. People with depression tend to expect and rate their social interactions to be more negative than those without depression (Soygüt & Savasir, 2001). If those who are depressed are more likely to feel rejected or to negatively interpret events, then comments and behaviors may be more likely to be perceived as microaggressive. These microaggressions could then be attributed to different aspects of the individual's identity, such as religion. Furthermore, depression could attract negative behavior from others (Joiner, Alfano & Metalsky, 1992), which could also be misinterpreted as microaggressive.

The other causal path is that exposure to religious microaggressions contributes to depressive symptom, with the cumulative weight of many microaggressions contributing to mental health deficits as prior microaggressions theorists have suggested (Sue, Capodilupo, et al., 2007). In fact, the two causal directions could work in concert to create a cycle of depression in which microaggressions contribute to poorer mental health, which then contribute to a greater likelihood of interpreting and experiencing interactions as microaggressive. A better understanding of these potential causal pathways is a topic ripe for future research. Experimental manipulation of experiences of microaggressions is ethically questionable, but researchers have suggested other methodologies such as priming techniques, use of vignettes, and mixed and longitudinal

designs to better understand the ways that microaggressions impact individuals (Lau & Williams, 2010; Lilienfeld, 2017; Ong & Burrow, 2017).

Future direction and next phase. The theory of microaggressions is a developing field of study, and there have been recent criticisms of how the concept of microaggressions is emerging in public discourse (e.g., Campbell & Manning, 2014; Etzoni, 2014; Lilienfeld, 2017). Some of these critics have focused on how the concept is used to silence healthy debate (e.g., Mac Donald, 2014), whereas others have argued that popularizing the concept encourages people to see themselves as fragile (e.g., Lilienfeld, 2017; Lukianoff & Haidt, 2015). Furthermore, both key microaggressions researchers and critics have warned against the frequent misinterpretations and misuses of the construct as it has made the leap from academic research to, for instance, university policies and political debate (e.g., Haidt, 2017; Zamudio-Suaréz, 2016;). Much of this criticism is valid, and people should be cautious in how they cast accusations and seek retribution for perceived microaggressions. The social applications of microaggressions research should continue to be debated, especially as the constructs continue to scientifically mature.

To summarize, I have thus far found that people generally hold the explicit belief that religious individuals are less intelligent but implicitly associate them with intelligence. Although I did not directly measure how these people's explicit and implicit associations affect their behavior towards religious believers, I examined experiences of overt and subtle forms of religious bias from the perspective of believers. Microaggressions is still a developing concept, but it is a form of prejudice that tends to rise outside of people's intentions and conscience, and thus, may be a good proxy to

measure the types of prejudice that arise from people's implicit beliefs. The present study found that believers of a variety of faith traditions report encountering both religious microaggressions and discrimination. Compared to those outside of the university, students reported higher incidences of being perceived to be scholastically inferior, close-minded and judgmental, and non-religious. These types of experiences relate to poorer mental health outcomes, and they may negatively impact religious believers' sense of identity and belonging within academia. As a lack of sense of belonging and perception of stereotypes are related to poorer academic adjustment and performance (Steele, 2010; Walton & Cohen, 2007; 2011), I will investigate the types of stereotypes that religious believers encounter and how these affect their academic performance in the next research phase.

CHAPTER IV

STUDIES 4-7: SCIENCE STEREOTYPE THREAT

This chapter contains materials from:

Rios, K., Cheng, Z.H, Totton, R., & Shariff, A. (2015). Negative stereotypes cause Christians to underperform in and disidentify with science. *Social Psychological and Personality Science*, *6*, 959-967. doi: 10.1177/1948550615598378.

Kimberly Rios and Azim Shariff were the principal investigators for these studies. Azim Shariff and I primarily designed and conducted Studies 4-5, whereas Kimberly Rios led Studies 6-7. I primarily conducted the analyses and writing for Study 5, and gave input to the writings included in this chapter.

Introduction

A wealth of research on women and ethnic minorities demonstrates the strong impact stereotypes have on undermining the academic performance of students in these groups (Steele, 2010). In these studies, merely increasing the salience of individuals' membership in a stereotyped group exacerbates their stereotyped behaviors. For example, African Americans who are asked to indicate their race prior to completing GRE questions will underperform compared to those who do not indicate their ethnicity (Steele & Aronson, 1995). Past experiments have also induced underperformance by telling participants that their intelligence is being measured or telling female students that math abilities are genetically determined (Dar-Nimrod & Heine, 2006; Steele & Aronson, 1995).

Underperformance occurs because these participants are reminded of the association between their identity and the associated stereotypes, which can create anxiety or "threat." The discomfort people feel when they are at risk of fulfilling a negative stereotype about their group then inhibits their academic performance, an effect known as stereotype threat (Steele, 1997; 2010). Not only do stereotype threat decrease performance immediately after groups are threatened, but it may also have long-term negative consequences for learning. For example, research with women in STEM has found that negative stereotypes can inhibit women's cognitive abilities to learn crucial mathematical rules and operations necessary to solve math problems (Rydell, Rydell, & Boucher, 2010).

These groups do not have to be a minority or be part of a disadvantaged group to be affected by negative stereotypes. Studies have shown that European Americans, an American majority group, are susceptible to underperformance in areas for which there are stereotypes about their skills (Aronson et al., 1999; Stone et al., 1999). Stereotypes are not only powerful in that they can negatively affect majority and traditionally privileged groups, also they do not need to be personally believed by individuals to negatively impact them. Indeed, the mere awareness that others endorse these stereotypes is sufficient to undermine performance (Steele, 1997).

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, Steele & Quinn, 1999).

Current Research

Across four studies, I will test people's awareness of negative stereotypes about religious groups in science (Studies 4-5), as well as the impact of such stereotypes on scientific identification (Study 6) and performance (Study 7). I will start by broadly examining stereotypes of different religious groups (Study 4), then focus on Christians (Studies 5-7) because of evidence that they tend to be stereotyped as less scientifically competent than other religious groups.

Study 4 (Stereotypes Regarding Different Religious Groups)

Method

Participants. Participants (n = 202) were recruited from Amazon's Mechanical Turk (mTurk) website. The participants were equally split between genders (51.0% females) with a mean age of 34.95 years. The sample was roughly equal between Christians and non-Christians (49% Christians). Thirty-three participants were omitted for failing a basic attention check item, leaving 169 in the final sample.

Procedure and Materials. All experimental materials were administered online. To investigate the stereotypes that different religious believers may encounter, participants were asked to rate the degree to which positive or negative stereotypes existed for Christians, Jews, Muslims and atheists (control) in the following domains:

- that group's overall competence
- that group's competence at science

- that group's trust in science
- that group's warmth

The Likert scale ranged from *-3* to *+3* with negative numbers indicating a negative stereotype (e.g., "less competent than the average person"*)* and with positive numbers indicating a positive stereotype ("more competent than the average person"*)*. A score of *0* indicated that *neither stereotype exists*. The presentation of each of the rated groups was randomized to minimize order effects.

Results

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 (*p*s < .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 6). Notably, both Christians ($M_{competence} = -.65$, $SE = 1.66$, $p < .005$; $M_{trust} = -.92$, $SE = 1.71$, $p < .001$) and non-Christians ($M_{competence} = -1.31$, $SE = 1.30$, $p < .001$; $M_{trust} = -1.89$, $SE = 1.26$, $p < .001$) recognized the societal stereotypes of Christians as low in competence in and trust of science. Jews and Atheists were stereotyped to be competent but cold (*p*s < .01). Muslims were negatively stereotyped across all domains (*p*s < .001). 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 (*t*s < -2.75, *p*s < .001) and trust in science (*t*s < 3.16, *p*s < .010) than Jews, Muslims, and atheists (see Figure 4).

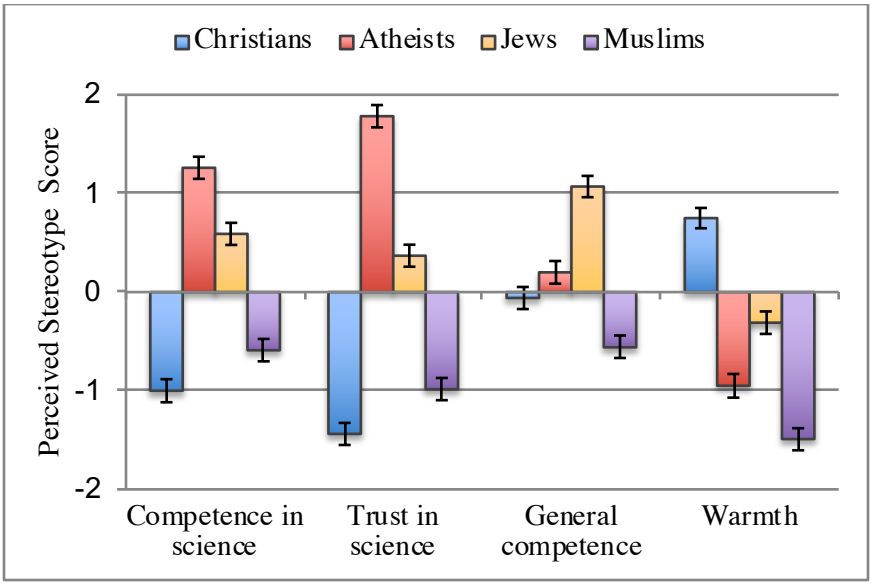
Table 6

Reported Stereotypes of (Non-)Religious Groups

Stereotypes	Christians	Atheists	Jews	Muslims
***N* = 169**	**Mean (SD)**			
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)**	.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)***

Note: Descriptive with means and standard deviations for stereotypes. Symbols indicate significance levels († at $p < .10$, * at $p < .05$, ** at $p < .01$, *** at $p < .001$).

Figure 4. Reported stereotypes associated with (non-)religious groups. Error bars represent standard error of means.



Study 5 (Stereotypes Regarding Different College Students)

Study 4 found that Christians and Muslims were negatively stereotyped in academic domains. Because Muslims were stereotyped negatively across domains, it may suggest a general negative attitude or Islamophobia (Nadal, Griffin, Hamit, Leon, Tobio, & Rivera, 2012) rather than specific stereotypes about their academic ability. Given that

Christians make up a large portion of college undergraduates in the United States, anti-science stereotypes of Christians may have a large impact on American students' pursuit of scientific careers. In Study 5, I examine science stereotypes for Christian college students, and compare it to other groups such as female college students who are traditionally negatively stereotyped and underrepresented in the sciences. I include questions regarding science and non-science subjects to test whether stereotypes regarding Christians are specific to the sciences. Although Study 4 found no negative stereotypes regarding Christians' competence, questions regarding general intelligence were added to see if I would replicate Study 1's explicit attitude finding where people tended to associate believers with lower intelligence.

Method

Participants. Participants (n = 237) from mTurk completed the study. Of those participants, 207 students (92 men, 114 female, 1 not reported; 165 undergraduate, 42 graduate or post bachelor students; M_{age} = 24.71) passed an attention check question. A total of 90 participants self-identified as Christian, whereas 113 self-identified as non-Christian (4 not reported).

Procedure and Materials. All experimental materials were identical to the previous study except participants were asked to rate stereotypes for atheist, Christian, female and male college students in the following domains:

- that group's interest in science subjects (e.g. biology, chemistry)
- that group's interest in non-science subjects
- that group's performance in science subjects
- that group's performance in non-science subjects

- that group's competence in science subjects
- that group's competence in non- science subjects
- that group's general competence
- that group's general intelligence

After indicating their belief in the existence of these stereotypes, participants also indicated the degree to which they personally believe any of the stereotypes to be true.

Results

Science stereotypes. Descriptive statistics for reported stereotypes associated with each group are reported in Table 7. One sample *t*-tests revealed that participants indicated that Christian and female students are stereotyped as being less interested, performing worse and being less competent in the sciences, and atheist and male student are stereotyped as being more interested, performing better and being more competent in the sciences ($p < .001$ for all t-tests; Table 7).

Non-science stereotypes. Participants indicated that, in contrast to anti-science stereotypes, Christians are stereotyped to be more interested, perform better and be more competent in the non-sciences than the average college student ($p < .001$ for all t-tests; Table 7). Participants reported that there are no stereotypes in this domain for atheist college students. Participants indicated that female students are stereotyped as being more interested, performing better and being more competent in the non-sciences ($p < .001$ for all t-tests). Participants indicated that male students are only stereotyped as less interested ($p < .001$) but not that they are stereotyped as performing worse or being less competent in non-science subjects.

General intelligence and competence stereotypes. Participants rated that Christian students are stereotyped as being less intelligent than an average student ($p <$ .01), but they also reported there are no stereotypes regarding general competency for Christian students. Participants rated that atheist, female and male students are stereotyped as being more intelligent ($p <$ .01 for atheist; $p <$ .05 for female; $p <$ .001 for male students) and competent than the average college student ($p <$ .01 for atheist; $p <$ .01 for female; $p <$ .001 for male students).

Table 7

Reported Stereotypes for College Student Groups

N = 207	Christians	Atheists	Males	Females
	Mean (SD)			
1. Interest in Sciences	-1.09 (1.68)***	1.52 (1.60)***	1.31 (1.42)***	-0.86 (1.69)***
2. Performance in Sciences	-0.55 (1.49)***	0.92 (1.57)***	1.05 (1.51)***	-0.64 (1.58)***
3. Competency in Sciences	-0.66 (1.52)***	1.08 (1.39)***	1.04 (1.39)***	-0.72 (1.56)***
4. Interest in Non-Sciences	0.80 (1.43)***	-0.23 (1.49)	-0.48 (1.62)***	1.16 (1.56)***
5. Performance in Non-Sciences	0.42 (1.29)***	0.02 (1.29)	-0.04 (1.48)	0.86 (1.53)***
6. Competency in Non-Sciences	0.36 (1.33)***	0.02 (1.30)	-0.09 (1.43)	0.76 (1.53)***
7. General Intelligence	-0.28 (1.54)**	0.77 (1.36)**	0.40 (1.33)***	0.25 (1.41)*
8. General Competency	-0.15 (1.41)	0.49 (1.31)**	0.39 (1.28)***	0.32 (1.38)**

Note: Descriptive with means and standard deviations for personal beliefs. *Indicates significance of $p <$ .05; **indicates significance of $p <$ .01. *** indicates significance of $p <$ .001.

Comparisons between groups for science. In order to probe how Christians and atheist students are viewed differently, I conducted pairwise t-tests. Participants indicated that Christians are stereotyped as being less interested, performing worse, and being less

competent in the sciences than atheist students ($p < .001$ for all pairwise t-tests). In regards to the non-sciences, participants indicated that Christian students are associated with more interest ($p < .001$), better performance ($p < .01$), and more competency ($p < .02$) in the non-sciences than atheist students. Participants also rated that Christians are associated with lower intelligence and competence than atheist students ($p < .001$ for all comparisons).

Consistent with the literature on prejudice against women in the sciences, male college students were perceived to be more positively stereotyped than females in terms of interest, performance, and competence in the sciences ($p < .001$ for all comparisons). In addition, participants rated that women are positively stereotyped in non-science domains ($p < .001$ for all comparisons). However, participants rated that there are no differences in how male and female students are stereotyped in terms of general intelligence and competency.

Notably, however, the levels of perceived anti-science stereotypes of women were no different from those perceived to be of Christians. For example, there were no significant differences in stereotypes associated with Christian and female students (all $p > .10$) for all the science items. This suggests that the negative stereotypes associated with Christians in the sciences are comparable to the stereotypes associated with women. All of these comparisons with *t*-test values and significance are reported in Table 8.

Table 8

Stereotype Comparisons Between College Groups

Stereotypes about Christians versus ($N = 207$)	Atheist	Female	Stereotypes about females versus male
1. Interest in Sciences	-14.18***	-1.56	-12.55***
2. Performance in Sciences	-8.86***	0.71	-10.97***

3. Competency in Sciences	-10.67***	0.48	-5.54***
4. Interest in Non-Sciences	6.47***	-2.81**	9.86***
5. Performance in Non-Sciences	2.81**	-3.60***	9.18***
6. Competency in Non-Sciences	2.36*	-3.17**	5.17***
7. General Intelligence	-6.29***	-4.19***	-1.06
8. General Competency	-4.32***	-3.92***	-0.53

Note. *T* and significance values for group comparison.

Personal beliefs regarding self: Descriptive statistics for personal beliefs in these stereotypes regarding Christians and women are reported in Table 9. Christians and women did not personally believe that they are worse in the sciences, ($p < .001$ for all comparisons) and female students indicated that they personally believe that women are more competent in the sciences than an average college student ($p < .03$). Both groups also indicated that they personally believe they are more intelligent, more competent, and better at the non-sciences than an average college student ($p < .001$ for all comparisons).

Outgroup personal beliefs: Non-Christians indicated that they personally believe that Christians are less interested, less competent and worse performing in science subjects as well as less intelligent and competent overall ($p < .001$ for all comparisons). They believed that Christians are more interested in non-science subjects than the average student ($p < .01$), but did not report believing that Christians are more competent or better performing at these subjects ($p > .10$). In addition, non-Christians reported that they believed Christian students to be less intelligence and competent than the average college student ($p < .001$; see Table 9).

Contrary to the general anti-outgroup bias found above, Christians reported that they personally believe atheist college students are more interested, competent, better performing in the sciences and are more intelligent than the average student ($p < .001$ for

all comparisons). They did not personally believe atheist students differed from the average college student in the non-sciences or in terms of general competence. Male participants reported that they personally perceive female students to be more intelligent and competent than the average college student ($p < .001$ for all comparisons). Men also believed that women are more interested, competent and better performing in non-science subjects ($p < .001$ for all comparisons). Finally, men did not report believing that women differ from the average student in terms of their interest, performance, or competence in science subjects.

These results suggest that either people personally hold more negative beliefs about Christians than about women, or that they are more willing to indicate their negative personal beliefs about Christians than female college students. In addition, it highlights that people's personal negative beliefs about Christians are unique to the sciences and intelligence, and are not a mere product of an anti-outgroup bias as Christians do not report the same anti-science beliefs regarding atheist students nor do men towards female students.

Table 9

Ingroup and Outgroup Personal Beliefs Regarding Christians and Women

	Christians about themselves (N = 90)	Females about themselves (N = 114)	Non-Christians about Christians (N= 120)	Christians about atheists (N = 90)	Males about females (N = 92)
1. Sciences Interest	-0.08 (1.57)	0.00 (1.45)	-0.86 (1.43)***	1.14 (1.48)***	0.00 (1.59)
2. Sciences Performance	0.08 (1.52)	0.17 (1.34)	-0.45 (1.28)***	.69 (1.18)***	0.03 (1.49)
3. Science Competency	0.23 (1.35)	0.26 (1.26)*	-0.59 (1.26)***	.71(1.23)***	0.24 (1.57)
4. Non-Sciences Interest	0.92 (1.26)***	0.99 (1.19)***	0.36 (1.41)**	-0.06 (1.43)	0.75(1.37)***
5. Non-Sciences	0.79 (1.14)***	0.75 (1.20)***	0.16 (1.13)	-0.11 (1.46)	0.77 (1.34)***

Performance					
6. Non- Sciences Competency	0.67 (1.14)***	0.67 (1.27)***	-0.11 (1.14)	-0.06 (1.15)	0.66 (1.38)***
7. General Intelligence	0.64 (1.17)***	0.60 (1.25)***	-0.62 (1.32)***	.28(1.11)*	0.60 (1.45)***
8. General Competency	0.58 (1.25)***	0.51 (1.33)***	-0.49 (1.26)***	.07(1.11)	0.61 (1.41)***

Note: Descriptive with means and standard deviations for personal beliefs. *indicates significance of $p < .05$; **indicates significance of $p < .01$. *** indicates significance of $p < .001$. We do not report significant associations for those below the Bonferroni corrected value.

Study 6 (Stereotypes Threat and Science Interest)

Study 5 found that negative stereotypes regarding Christians are domain specific, where Christians are perceived to have lower interests and abilities in the sciences but not in non-science subjects. These stereotypes are comparable to the negative stereotypes about women in the sciences although people report not personally believing in the stereotypes associated with women. Non-Christians personally believe Christians are inferior at, and are uninterested in science, suggesting the stereotypes are both pervasive and socially acceptable. In Study 6, I will test 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 undergraduate college students (39 men, 61 women; M_{age} = 19.36, 62 Christians, 35 non-Christians, 3 unspecified) completed a laboratory study for credit. Participants reported their religious affiliation in a pre-screening survey. Three

participants who suspected that the news article was not real and three participants whose religious affiliation was unspecified were dropped from 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 threat conditions 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 (or good) at science. Participants in the no article condition received the dependent measures without reading an article.

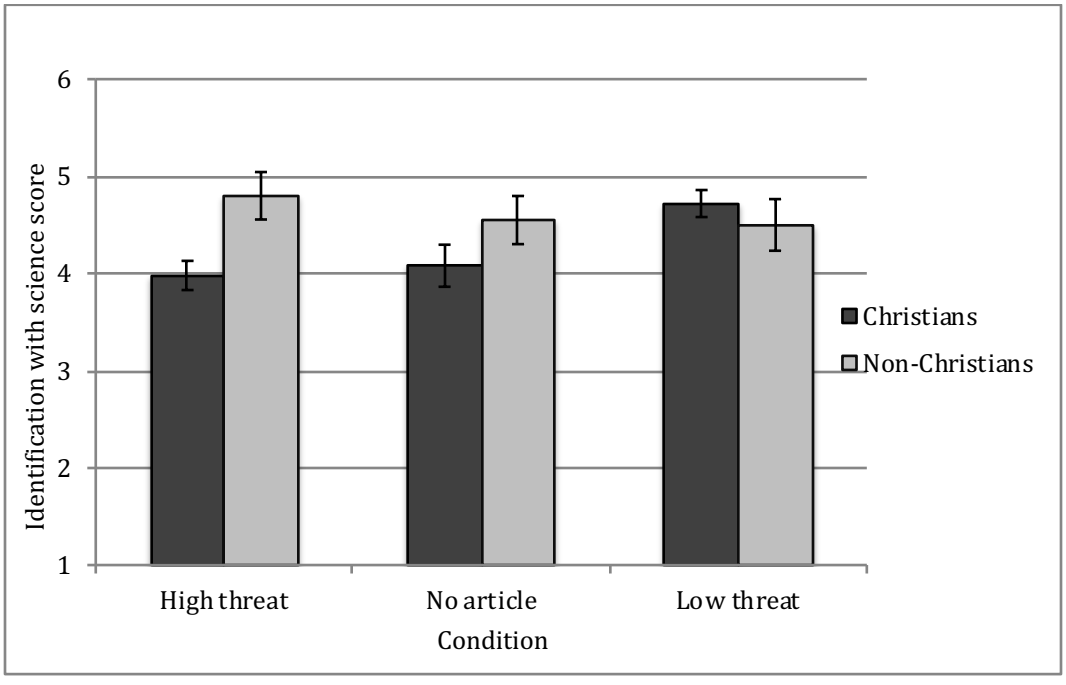
Next, participants completed a 20-item self-reported measure of their interest in and aptitude for scientific reasoning and problem solving, adapted from Marsh and O'Neil (1984). Example items include "I would have no interest in being an inventor" (reverse-coded) and "I am quite good at science." Participants responded on a 7-point scale (1 = *strongly disagree*, 7 = *strongly agree*), and their responses were averaged into a composite (M = 4.38, SD = .82; α = .87). Finally, participants were probed for suspicion and debriefed.

Results

A 3 (condition: high-threat versus low-threat versus no article) X 2 (religious identity: Christian versus non-Christian) ANOVA revealed that Christian students (M = 4.26, 95% 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, η_p^2= .07. However, this main effect was qualified by a two-way interaction, $F(2, 87) = 3.59$, p = .032, η_p^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-Christian students (M = 4.80, 95% CI: 4.34-5.26), $F(1, 87) = 8.55$, p = .004, η_p^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, η_p^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, $p > .250$, η_p^2= .01 (see Figure 5).

Figure 5. Identification and interest in science as a function of threat condition and Christian identity.



Study 7 (Stereotypes Threat and Science Performance)

Study 6 suggests that Christian college students' science interest and identification tend to suffer unless the anti-science 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 (as demonstrated in Study 5), 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, Fryberg, Markus, Johnson & Covarrubias, 2012). Notably, however, Christian college students express as much interest in science as non-Christians when reassured that others do not endorse the negative stereotypes.

Study 7 tests the consequences of these stereotypes for Christians' academic performance in science. 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.

Method

Participants. One hundred and seven college students (43 men, 64 women; M_{age} = 20.88) participated in exchange for partial course credit. To be eligible for the study, participants must have completed a pre-screening survey at least one week before the experiment. Thirty-nine participants self-identified as Christian, whereas 64 participants self-identified as non-Christian. Four participants did not specify their religious

affiliation, so they were dropped from analyses. Additionally, eleven 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. After signing up, but no less than one week prior to the study, participants were sent a link to the pre-screening survey. In addition to the demographic and religious affiliation questions, the survey included Preston and Epley's (2005) 5-item Belief in God scale as a measure of religiosity (e.g., "What is the general importance of God in your life?"). Participants responded on 11-point scales (1 = *not at all*, 11 = *extremely*), and their responses were averaged.

The day before the study, the experimenter emailed participants to tell them that there was not enough space in the Psychology Department to hold sessions, and that (depending on experimental condition) they would take the study in either the Divinity School (a less threatening context for Christians; $n = 47$) or the Physical Sciences building (a more threatening context for Christians; $n = 43$). To increase awareness of the context, upon arrival to their assigned building, all participants read an adapted mission statement of the relevant department and were asked to evaluate it on dimensions such as clarity and quality of writing.

In reality, the mission statement was intended to strengthen the manipulation, and to either imply (Divinity School condition) or not imply (Physical Sciences condition) that science and religion could be considered compatible. In the Divinity School condition, it contained phrases indicating that many of the school's faculty members hold joint appointments in departments such as Medicine, Law, and Anthropology, and that

the school believes ideas should be "subject to uncompromising standards of argument and evidence." In the Physical Sciences condition, it contained references to the number of Nobel Prizes awarded to the faculty, and the joint appointments that the division's faculty members hold at local research institutions.

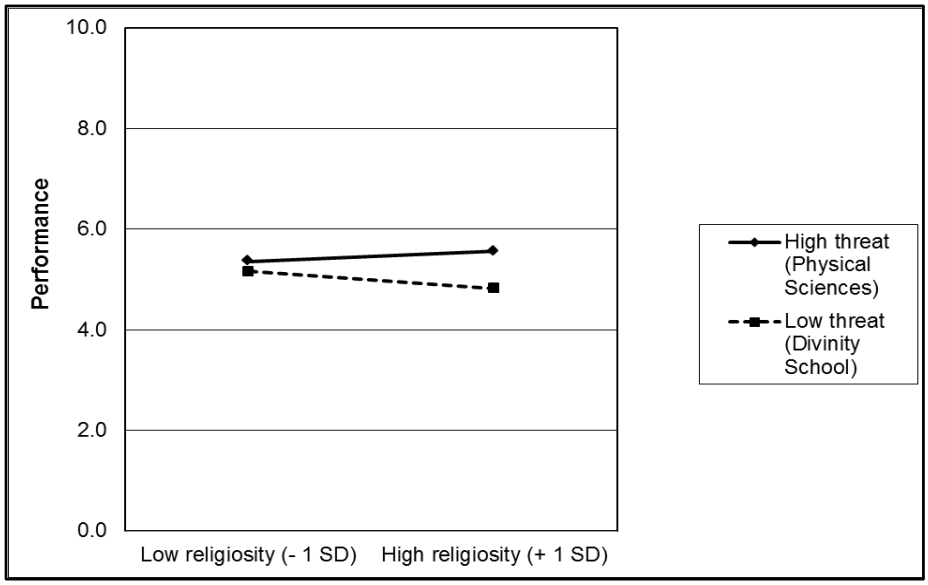
Next, participants completed a measure described as a logical reasoning test, which consisted of ten questions from the former GRE analytical section (e.g., "David ranks seventh from the top and 28th from the bottom in a class. How many students are there in the class?" (a) 36, (b) 35, (c) 34, (d) cannot be determined, (e) none of the above; *M*=5.31, *SD*=1.53) to create a performance score for each participant (M = 5.31, SD = 1.53). Finally, participants were probed for suspicion and fully debriefed.

Results

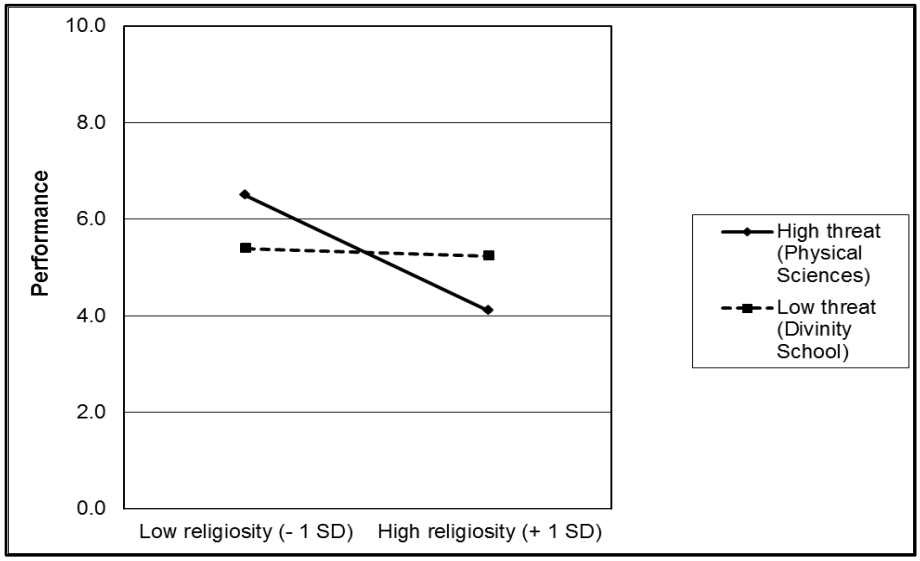
Because Christians (M = 7.32, SD = 2.73 on an 11-point scale) and non-Christians (M = 2.74, SD = 1.96) differed significantly in religiosity, $t(101) = -9.88$, $p < .001$, data was analyzed as two separate location (0 = Physical Sciences, 1 = Divinity School) x religiosity (mean-centered) interactions for Christians and non-Christians, using multiple regression (Aiken & West, 1991). A two-way threat context X religiosity multiple regression was significant for Christians (b = .72, SE = .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 = .14, t (28) = -4.45, $p < .001$), and was uncorrelated with performance in the low-threat context, b = .09, SE = .09, $t(28) = 1.03$, $p > .250$ (see Figure 6).

Figure 6. Correct solutions as a function of Christian identity, threat context, and religiosity (+/- 1 SD).

Non-Christians:



Christians:



Study 7 showed that mere contextual cues relevant to science could trigger underperformance in religious students (Cheryan et al., 2009; Murphy et al., 2007). Because religiosity correlated negatively with performance in the high-threat context, these results suggest that the impact of negative stereotypes is strongest among highly

identified group members (whose group membership is important to their self-concept; Schmader, 2002).

General Discussion

These studies overall demonstrate that increasing the salience of pervasive anti-science stereotypes about Christians (Studies 4 and 5) can lead them to disidentify with science (Study 6), and to underperform on scientific tasks especially for the highly religious (Study 7). In Study 4 and 5, I found that these stereotypes are specific to competence and trust in science, and do not extend to general competence or non-science subjects. Study 6 demonstrated that increasing the awareness of these negative stereotypes about Christians in science can lead Christians to become less interested in science. Study 7 showed that mere contextual cues could prime Christians to underperform on science-relevant tasks, especially among those who are highly religious. The effect sizes of Study 6 and 7 are of medium to large size, demonstrating that the overall effects of these stereotypes are harmful and consequential. As with other stereotyped groups, Christians may face a perpetuating cycle whereby they underperform due to the existing stereotypes, thereby confirming those original stereotypes. Together, these four studies highlight the existence—and reveal the cost—of pervasive negative stereotypes about Christians' ability in science.

In regards to the mechanisms leading to disidentification and underperformance, Study 5 demonstrated that Christians did not personally endorse anti-science stereotypes about their group, despite their awareness of the existence of such stereotypes. It is possible that Christians may disidentify with science perceived not to "match" their religious identity because 1) they believe that others stereotype them as not belonging in

science (Steele et al., 2002; Stephens et al., 2012); 2) because they believe their religious values are incompatible with science (see Nosek, Banaji, & Greenwald, 2002); 3) because they believe they will fare better in the non-sciences (Study 5); or 4) other groups fare better in the sciences (Study 5). However, Study 5 demonstrates that it is unlikely that self-stereotyping is the *only* reason behind Christians' underperformance as they do not personally believe that they are bad at science. Rather, Christians' anxiety about confirming the negative stereotypes could undermine their performance, engagement, and interest in science similar to how researchers have proposed this be true for other groups such as women and ethnic minorities (Steele & Aronson, 1995).

However, unlike women and ethnic minorities, on whom much research about negative intellectual stereotypes has focused, American Christians are a dominant majority group (75% of the population; Gallup, 2015), and not one generally perceived as disadvantaged. Yet, context matters; in academic and scientific domains, different proportions of religious believers and a potentially very different climate exist. Christian underrepresentation in science may be caused by self-selection (choosing not to enter science-related fields), underperformance (not succeeding in said fields), and potentially biased behaviors from others, all of which are exacerbated by negative stereotypes. Because Christians constitute such a large proportion of the U.S. population, 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.

CHAPTER V

IMPLICATIONS FOR DIVERSITY IN ACADEMIA AND SCIENCE FIELDS

The main focus of this dissertation was to investigate people's attitudes toward religious individuals, and how these attitudes affect the mental health and academic performance of these individuals. Study 1 found that participants tended to explicitly report associating religious believers with lower intelligence, but to implicitly associate them with higher intelligence. Studies 2-3 showed that religious believers of diverse backgrounds reported experiencing overt and covert forms of religious bias, including ones related to their academic ability. Finally, Studies 4-7 demonstrated that Christians in particular are stereotyped to have lower competency in science, which causes them to disidentify with and underperform in science relevant tasks.

The Academic and Science Context

There was evidence across multiple studies that a bias against religious individuals tended to be more prevalent in secular academic institutions. In Study 1, faculty and students from secular universities perceived all non-religious target groups to have higher intelligence than the religious target. In addition, they were significantly more likely than students and faculty from a religiously affiliated university to associate religiosity with lower intelligence. Although people implicitly associated religion with intelligence, faculty and students from secular institutions were less likely to do so compared to those from religiously affiliated universities. In addition, faculty members, particularly those from secular institutions, did not have an implicit association between religion and intelligence and had the strongest congruity between their explicit and implicit intelligence preference.

In Studies 2-3, religious believers reported that they encountered more incidences of overt and covert forms of religious bias inside of higher education than outside of academia. Specifically, university students reported that they felt they were more likely to be assumed to possess less scholastic ability and achievements inside an academic context than outside. Experiences of religious microaggressions significantly predicted higher rates of depression in Study 2 and marginally in Study 3.

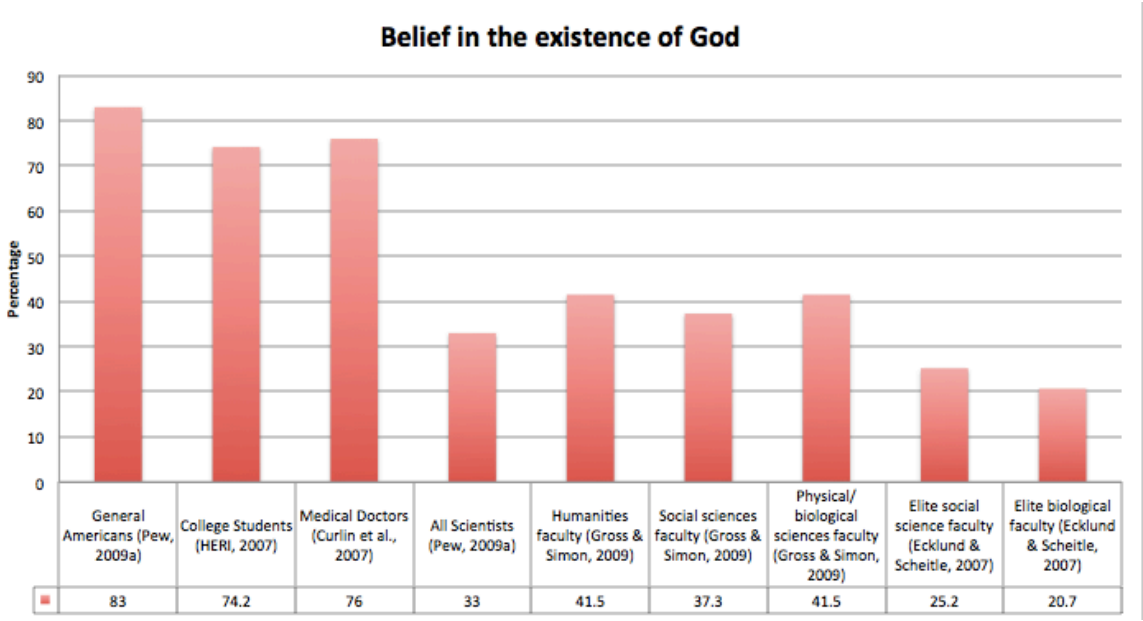
Study 4 found that compared to other religious groups, people perceived Christians to lack science competency. Study 5 demonstrated that these stereotypes applied to Christian college students and was at a comparable rate to how women are stereotyped to have a lack scientific competency and interest. Study 5 also showed that Christians were perceived to be less interested in and to have inferior ability in the sciences specifically; they were stereotyped to be more interested in the non-sciences and were not stereotyped to lack general competency. Finally, Study 6 and 7 demonstrated that these negative stereotypes cause Christian college students to become less interested in and identify less with science, as well as underperform on science relevant tasks.

College is a crucial turning point for many groups' pursuit of academic and scientific careers. For example, African Americans, Latinos, and women who begin college with science aspirations are less likely to persist in science fields than their male and Asian American counterparts, making college one of the earlier key exit points from scientific careers (Moss-Racusin, Dovidio, Brescoll, Graham & Handelsman, 2012). For religious college students, data shows that 74.2% of college students reported believing in the existence of God [Higher Education Research Institute (HERI), 2007) and about 72.5% of college students have a religious affiliation (HERI, 2014). Religious students

enter science majors at the same rate as secular students [(American Religious Identity Survey (ARIS), 2013]. Majors in science, technology, engineering and mathematics (STEM) were by far the most popular for religious believers (40% vs. 27% in social sciences, 27% in humanities, and 5% in other). If STEM and social science majors are combined, then the majority of religious college students (67%) major in some form of the sciences (ARIS, 2013). These suggest that a high percentage of religious students are initially interested in science. In addition, the percentage and number of religious students majoring in the sciences are similar to (and slightly higher than) those of secular students. Religious students (40%) are majoring in STEM at a slightly higher rate than secular students (38%), and secular students are majoring in the social sciences (29%) and humanities (30%) at a slightly higher rate than religious students (27% in social sciences and 27% in the humanities; ARIS).

Despite religious believers being a large proportion of the college student populations and a large percentage of these believers majoring in the sciences, there are relatively few religious individuals who ultimately enter the academic and scientific professions (see Figure 7). Professors and scientists, particularly natural and social science faculty members at elite universities, identify as being less religious and more non-religious than the general American population (Ecklund & Scheitle, 2007; Gross & Simmons, 2009; Pew Research Center, 2009). Among scientists, there is a substantial decrease in religiosity where only about a third of scientists belonging to the American Association for the Advancement of Science (AAAS), the world's largest general scientific society, believe in the existence of God (Pew Research Center, 2009).

Figure 7: Belief in God by different groups with statistics taken from similar years



My dissertation shows that part of the reason there may be a leaky pipeline for religious believers in academia and science is due to bias and negative stereotypes. Religious students in the sciences may be underperforming due to stereotype threat, which then will appear to confirm the stereotypes about their competence. Because perceptions of personal performance are a strong predictor of success and retention in academic fields (Ehrlinger & Dunning, 2003), religious believers may discontinue and self-select out of the sciences if they perceive themselves doing poorly in the sciences.

Implications In Light of Research with Women and Ethnic Minorities

Research conducted on women and ethnic minorities may offer insight into the psychological factors affecting religious believers' representation and trajectory in academia and the sciences. Although this is the case, it is important to acknowledge several ways in which religious believers are different from ethnic minorities and women. One, religious believers as a whole belong to a privileged group in America, and atheists face a high level of prejudice in America (e.g. Gervais et al., 2011). Some religious minorities like Muslims face a high level of discrimination in society, but in general,

religious individuals as a group enjoy certain privileges; thus, they face fewer or different barriers than traditionally disadvantaged groups.

In addition, although genetics influence religiosity and some people are identified with their family's religion (Koenig, McGrue, Krueger, & Bouchard, 2005), religious identity is more fluid than one's race or sex (although ethnic and gender identity can change). This poses some limitations and makes the issue of the lack of religious believers in science more complex. For example, similar rates of religious and secular college students are majoring in STEM and in the social sciences (ARIS, 2013), but there are substantially fewer religious science faculty and professionals.

Is the underrepresentation of religious believers in science accounted for by religious believers never entering scientific careers post college, religious believers becoming non-religious as they continue their scientific training, or religious believer not continuing with science positions after advanced training? There has been little research examining and differentiating among these potential reasons. These factors may be particularly challenging to tease apart given that one's religion is not as fixed as one's race and sex.

Another difference between religion and other demographics is that religion is based on a system of beliefs. This may pose some unique challenges for religious individuals because some religious teachings are held up as truths, thus religious individuals would have to reconcile or work around claims that may contradict scientific findings. In addition, one's religion is more concealable than one's gender or race. It is possible that this may buffer believers against some discrimination because religious individuals have more control over who finds out about their religious identity, or they

may experience more overt forms of bias, as other people are not aware (and thus less likely to filter) what they say about religious individuals.

Although religion has more similarities with political orientation (e.g., both having to do with viewpoint diversity) than with race or gender, research on political diversity and discrimination are only emerging (Duarte et al., 2015; Inbar & Lammers, 2012). Thus, despite the limitations of comparing religion with gender and race, research conducted with women and ethnic minorities may offer the best available research to understand the factors and solutions to the lack of religious believers in science. Despite the fluidity of religion and its ability to be concealed, the salience of one's religion and the impact religion on an individual can be just as important as one's gender or race. Religious beliefs and practices are personally chosen and influence people's notions of meaning, morality, and significance, which means one's religious identity may be just as important as one's racial or gender identity in influencing one's concept of self, abilities, and direction in life (Norenzayan & Shariff, 2008; Pargament, Magyar, Russell & Murray; Swank, 2005; Park, 2005).

Drawing from research with women and ethnic minorities, there are several reasons why social identities, such as one's religion, can impact one's academics and interests (Cohen & Garcia, 2008). According to Cohen and Garcia's (2008) Identity Engagement Model, people are vigilant for situational cues for whether or not they will be treated negatively or perform poorly because of their social identity. Previous research shows that stereotyped individuals like women and ethnic minorities are aware of cues indicating whether or not they belong to science, and feedback can be interpreted negatively as evidence that they do not belong (Dasgupta, 2011; Smith, Lewis,

Hawthorne & Hodges, 2012; Steele, Spencer, & Aronson, 2002). When stereotyped individuals' social identity is threatened and they do not think they have the resources to cope with the threat, the threat may lead to lower interest and engagement (Cohen & Garcia, 2008). For example, women who are exposed to gender stereotypes are also less likely to answer math questions and focus more on verbal questions (Davies, Spencer, Quinn, & Gerhardstein, 2002), suggesting a tendency to disengage and disidentify with subjects that they are negatively stereotyped in.

This is congruent with Study 6's findings, where Christian college students' reported interest in science dropped below those of non-Christians when they read that others thought Christians lacked science competency. But after Christians were told that others perceive them to be good at science, their interest in science was at the same level as non-Christians' interest. Because religious believers, in particular Christians, are stereotyped to be less competent and interested in science, they may be vigilant for threatening cues in science contexts as other stereotyped groups have been shown to do. If they detect threats, experience hardships in science classes, or do not feel like they belong academically, then they may question their suitability for academia and science. This can deter religious believers from becoming interested in and entering science, and lead them to self-select out of what they might perceive to be a potentially hostile and isolating field that does not "match" their identity.

My dissertation also found that religious believers were assumed to be inferior in their academic and scholastic achievements (Studies 2-3) and were stereotyped to be less intelligent than the average college student (Study 5). This suggests that religious students may question their academic or intellectual belonging and may underperform in

domains outside of science due to general stereotypes about their intelligence. Future studies should explore this possibility as this may contribute to religious believers' underrepresentation in academia and lower intelligence test performance (Zuckerman et al., 2013).

Religious students' underperformance not only affects religious individuals' view of themselves, but also affects their professors' and employers' beliefs about religious individuals' abilities to conduct science. My dissertation generally found that religiosity is associated with lower intelligence, and non-religious individuals both perceive and personally endorse anti-science stereotypes about religious believers. If professors or employers know the religious identity of their students or employees, and these religious individuals underperform due to anxiety about confirming negative stereotypes about their scientific competence, then this may confirm the pre-existing beliefs about religious individuals' abilities to perform in science. Overall, underperformance in science can confirm stereotypes about religious believers' scientific abilities, which diminishes their likelihood of pursuing science-related disciplines and careers.

While people may self-select out of academic and science disciplines, factors such as bias and discrimination can push groups out of the academic and science pipeline. For example, research show that both students and faculty are more willing to hire male applicants than women for science lab manager positions or a position that requires math (Moss-Racusin, van der Toorn, Dovidio, Brescoll, & Handelsman, 2014; Reuben, Sapienza, & Zingales, 2014). Another study found that people are more willing to hire men than women for a position that required math performance even when they were provided with information about equal past math performance of applicants (Reuben et

al., 2014). Further, ethnic minorities are less likely than European Americans to receive National Institute of Health funding even after controlling for key variables such as educational background, research productivity, and awards (Ginther et al., 2011). Last, academics reported that they would be more biased against conservatives in faculty hires, symposium invitations, and journal and grant review (Inbar & Lammers, 2012).

Prior studies and this dissertation have documented people's reported negative attitudes or willingness to discriminate against religious believers (Yancey, 2011), and religious believers' report of experiencing prejudice in academia (e.g., Hodge, 2006; Hyers & Hyers, 2008; Yancey, 2011). However, only one study has experimentally demonstrated that people act upon their negative beliefs about religious believers. Gartner (1986) found that professors were more likely to negatively evaluate graduate school applicants who were religious than those who had no mention of religion on their application (and otherwise was identical to the religious applicant). As that study is over 3 decades old (and academia has become increasingly secular), future research should update and experimentally investigate how people's reported negative perceptions about religious believers' academic and scientific abilities may bias their treatment towards this group.

Psychological Interventions to Increase Representation

Academic interventions and strategies to lessen the achievement gap experienced by ethnic minorities, first-generation, and female college students may provide insight into how to increase religious believers' participation and performance in academia and science. Previous research shows that exposure to certain role models who belong to the stereotyped group (Marx & Goff, 2005; Marx & Roman, 2002), affirmation of important

personal values (Cook, Purdie-Vaughns, Garcia, & Cohen, 2012; Miyake et al., 2010) and increasing a sense of belonging (Walton & Cohen, 2007; 2011) can help mitigate the negative effects of stereotype threat. For example, when participants have a competent in-group experimenter, women and black college students performed better on diagnostic tests than those who did not have an experimenter who shared the same background (Marx & Goff, 2005; Marx & Roman, 2002). In addition, women who are exposed to successful women in STEM performed better on diagnostic math tests although exposure to stereotypical role models (e.g., geeky females in computer science) can have negative effects (Cheryan, Siy, Vichayapai, Drury, & Kim, 2011; Marx, Stapel, & Muller, 2005; McIntyre, Paulson, & Lord, 2003). New research examining the outcome of exposure to prominent religious or atheist scientists shows people are more likely to take a collaborative view of science and religion after learning about a high-profile scientist who believes in the compatibility between religious and science (Scheitle & Ecklund, 2017). Future research can examine whether exposure to such religious scientists can positively affect religious students' engagement, ability, understanding and practice of science.

Self-affirmation involves reflecting on important aspects of one's life or engaging in an activity that makes salient important values that are not related to the stereotyped domain (Miyake et al., 2010). Value affirmation interventions are sought to be effective and buffer against psychological threat because they are able to help those who are facing stereotype threat to reestablish a sense of personal worth, and to gain internal resources necessary for coping with a threatening environment (Miyake et al., 2010). Studies show that women who affirmed a valued trait performed better than women who were in the

control or stereotype threat condition (Martens, Johns, Greenberg, & Schimel, 2006). African American and Latino students who completed one or multiple self-affirming exercises had better grades than those in the neutral/control condition (Cohen, Garcia, Apfel, & Master, 2006; Sherman et al., 2013), while European American students' grades were unaffected by these value affirming exercises.

A recent experimental study demonstrates that the effectiveness of the intervention depends on the threatened target (Shapiro, Williams, & Hambarchyan, 2013). Group-as-target stereotype threat occurs when people worry that their performance will reflect badly on the stereotyped group as a whole. These are concerns about being a bad ambassador for the group (e.g., a woman being concerned that her potential performance on a science task proves that *all women* are less competent in science). Self-as-target stereotype threats, on the other hand, are concerns about how being members of a stereotyped group can affect people's perception about their individual performance. These are concerns about being personally judged on the basis of existing stereotypes (e.g., a woman being concerned that her performance on a science task proves that she *as a woman* is less competent in the sciences). Shapiro and colleagues (2013) found that for African American and female students, role model interventions were only effective in targeting group-as-target stereotype threats while value affirmation interventions were successful in buffering against self-as-target stereotype threats. Depending on how religious students experience stereotype threat (group vs. self vs. both), being exposed to role models who are in the sciences and having students affirm their own values may be effective interventions.

Although interventions that have been effective with these traditionally disadvantaged groups may also be successful with religious students, there may be some modifications and tailoring that needs to be done for religious students as they differ from these groups in some aspects. For example, brief psychological interventions to help ethnic minority students feel a greater sense of belonging in universities have reduced the effects of stereotype threat on academic performance and health (Walton & Cohen, 2007; 2011). Recently, researchers started to differentiate between different types of belonging uncertainty where certain groups may experience a lack of belonging in specific domains (Lewis & Hodges, 2015). For example, ethnic minority college students and first generation college students may be underrepresented both academically and socially, thus social belonging interventions may be particularly effective for them (Stephens, Hamedani, & Destin, 2014; Walton & Cohen, 2007; 2011). Women, because they tend to make up the majority of college students, may only feel excluded or uncertain in their abilities in STEM fields (Aud et al, 2011; Lewis & Hodges, 2015). Therefore, interventions may vary depending on the unique needs of the group.

Religious college students may also feel isolated in different ways from ethnic minority and first-generation students. Religious college students, as they make up a substantial population of the college student body, may not struggle with feeling a sense of social belonging or finding peers with similar interests as much as they may feel excluded academically or in science fields. Prior studies highlight how religious believers feel that professors demean their religious identity, and are excluded in the academic discourse (Hyers & Hyers, 2008). Christians face negative stereotypes about their intelligence and science competencies, thus they may face uncertainties in academia in

general, and in science in particular. Future belonging interventions targeting religious believers may need to be tailored so that religious believers feel accepted academically or in the sciences.

The lack of religious believers in academic and scientific disciplines has negative consequences for the science participation of Americans and the advancement of science. Americans are less likely to pursue scientific careers than careers in other fields, and have lower science literacy scores compared to citizens of many Asian and European countries (Moss-Racusin et al., 2014; National Center for Educational Statistics, 2012). Low science participation and literacy are problematic because scientific advances are central to societal competitiveness and flourishing due to their influence on public policy, medical and technological advances, and innovations (Press & Leshner, 2013). Studies show that financial investment into basic science yields an annual return rate of 20-60% on such investments (Press & Leshner, 2013).

Decades of research and advocacies have focused on increasing ethnic minorities' and women's participation in academia and in the sciences (Ginther et al., 2011; Moss-Racusin et al., 2012; Reuben et al., 2014). They have led to an increase in their participation, although much more work is needed to bring them to equality with European Americans and men in science (Kessel & Nelson, 2011). There has been limited attention and research on the lack of religious believers in science, but psychological research and interventions conducted with ethnic minorities' and women's participation can provide the blueprint for what can be done to increase religious believers' performance and representation in science, and to understand why they are underrepresented in and not pursuing the sciences. The factors contributing to the lack of

religious believers in the sciences are cyclical, but intervening in just one area may lead to positive ripple effects.

In addition, because women and ethnic minorities tend to have stronger religious identities than European American males (Pew Research Center, 2009; Sherkat, 2007), addressing the underrepresentation of religious believers may be an additional way to increase these other underrepresented groups' participation in the sciences. Research on strategies to increase religious individuals in science can also inform interventions and strategies to increase the women and ethnic minorities in science. Overall, remedying the pathways contributing to the lack of religious believers in academia and science can encourage a substantial percentage of the population to become more involved in the sciences and increase the U.S.' overall science participation.

APPENDIX A

IAT WORDS

Intelligence	Unintelligence
1. Smart	1. Dumb
2. Brilliant	2. Stupid
3. Genius	3. Dim-witted
4. Brainy	4. Dim
5. Clever	5. Doltish
Theist	**Atheist**
1. Religious	1. Non-religious
2. Believer	2. Non-believer
3. Adherent	3. Skeptic
4. Devotee	4. Disbeliever
5. Churchgoer	5. Unbeliever

APPENDIX B

THE MICROAGGRESSIONS AGAINST RELIGIOUS BELIEVERS SCALE (MARIS)

Factor 1: Assumption of Inferiority
1. Others are surprised at my professional success because of my religion.
2. Others are surprised at my scholastic success because of my religion.
3. Others have assumed I am less educated because of my religious identity.
4. Others have assumed that my work would be inferior because of my religion.
Factor 2: Religious Stereotyping
1. Others have assumed I am homophobic because of my religion.
2. Others have assumed I am close-minded because of my religion.
3. Others have assumed that I am judging them because of my religion.
Factor 3: Assumption of Non-religiosity
1. Others have assumed that I do not believe in God or Gods.
2. Others acted surprised that I do believe in God or Gods.
3. Others have assumed that I do not attend places of worship without first asking if I identify as a non-religious individual.

REFERENCES CITED

Chapter I

Argote, L., Gruenfeld, D., & Naquin, C. (2000). Group learning in organizations. In M. E. Turner (Ed.), *Groups at work: Theory and practice* (pp. 369–211). Mahwah, NJ: Erlbaum.

Aronson, J., Lustina, M. J., Good, C., Keough, C., Steele, C. M., & Brown, J. (1999). When white men can't do math: Necessary and sufficient factors in stereotype threat. *Journal of Experimental Social Psychology, 35,* 29-46.

Arrow, K. J. (1972). Gifts and exchanges. *Philosophy & Public Affairs*, *1*, 139-158. doi: 10.1515/9781400853564

Cheng, Z.H., Pagano, L. & Shariff, A. (in press). The development and validation of Microaggressions Against Religious Individuals Scale (MARIS). *Psychology of Religion and Spirituality*.

Crawford, J. T., Duarte, J. L., Haidt, J., Jussim, L., Stern, C., & Tetlock, P. E. (2015). It may be harder than we thought, but political diversity will (still) improve social psychological science. *Behavioral and Brain Sciences*, *38*, 45-58.

Crosby, F. J., Iyer, A., Clayton, S., & Downing, R. A. (2003). Affirmative action: Psychological data and the policy debates. *The American Psychologist*, *58*, 93–115. doi:10.1037/0003-066X.58.2.93

Duarte, J. L., Crawford, J. T., Stern, C., Haidt, J., Jussim, L., & Tetlock, P. E. (2015). Political diversity will improve social psychological science. *Behavioral and Brain Sciences*, *38*, 1-13.

Ecklund, E. H., & Scheitle, C. P. (2007). Religion among academic scientists: Distinctions, disciplines, and demographics. *Social Problems*, *54*, 289–307. doi:10.1525/sp.2007.54.2.289

Edgell, P., Gerteis, J., & Hartmann, D. (2006). Atheists as "other": Moral boundaries and cultural membership in American society. *American Sociological Review, 71*, 211–234. doi: 10.1177/000312240607100203

Gallup Poll (2012). Atheists, Muslims see most bias as presidential candidates: Two-thirds would vote for gay or lesbian. Retrieved from http://www.gallup.com/poll/155285/atheists-muslims-bias-presidential-candidates.aspx

Gartner, J. D. (1986). Antireligious prejudice in admissions to doctoral programs in

clinical psychology. *Professional Psychology: Research and Practice*, *17*, 473–475. doi:10.1037//0735-7028.17.5.473

Gervais, W. M., Shariff, A. F., & Norenzayan, A. (2011). Do you believe in atheists? Distrust is central to anti-atheist prejudice. *Journal of Personality and Social Psychology*, *101*, 1189–206. doi: 10.1037/a0025882

Gross, N., & Simmons, S. (2009). The religiosity of American college and university professors. *Sociology of Religion*, *70*, 101–129. doi:10.1093/socrel/srp026

Gurin, P., Dey, E., Hurtado, S., & Gurin, G. (2002). Diversity and higher education: Theory and impact on educational outcomes. *Harvard Educational Review*, *72*, 330–366.

Hodge, D. R. (2006). Moving toward a more inclusive educational environment? A multi-sample exploration of religious discrimination as seen through the eyes of students from various faith traditions. *Journal of Social Work Education*, *42*, 249–267. doi:10.5175/JSWE.2006.200400455

Homan, A. C., van Knippenberg, D., Van Kleef, G. A, & De Dreu, C. K. W. (2007). Bridging faultlines by valuing diversity: Diversity beliefs, information elaboration, and performance in diverse work groups. *The Journal of Applied Psychology*, *92*, 1189–1199. doi:10.1037/0021-9010.92.5.1189

Hood, R.W., Spilka, B., Hunsberger, R., & Gorsuch, R. (1996). *The psychology of religion: An empirical approach* (2nd ed). New York: Guilford.

Hyers, L. L. (2007). Resisting prejudice every day: Exploring women's assertive responses to anti-Black racism, anti-semitism, heterosexism, and sexism. *Sex Roles*, *56*, 1–12. doi:10.1007/s11199-006-9142-8

Hyers, L. L., & Hyers, C. (2008). Everyday discrimination experienced by conservative Christians at the secular university. *Analyses of Social Issues and Public Policy*, *8*, 113–137. doi:10.1111/j.1530-2415.2008.00162.x

Inbar, Y., & Lammers, J. (2012). Political diversity in social and personality psychology. *Perspectives on Psychological Science*, *7*, 496–503. doi:10.1177/1745691612448792

Janis, I. L. (1982). *Groupthink* (2nd ed.). Boston: Houghton-Mifflin.

Kim, P. Y., & Lee, D. (2014). Internalized model minority myth, Asian values, and help-seeking attitudes among Asian American students. *Cultural Diversity and Ethnic Minority Psychology*, *20*, 98.

Motyl, M., & Iyer, R. (2015). Diverse crowds using diverse methods improves the

scientific dialectic. *Behavioral and Brain Sciences*, *38*, 33-34.

Pew Research Center (2009). Public opinion on religion and science in the United States. Retrieved from http://www.pewforum.org/2009/11/05/public-opinion-on-religion-and-science-in-the-united-states/

Putnam, R. D. (1993). The prosperous community: Social capital and public life. *The American Prospect*, *4*, 35-42.

Rios, K., Cheng, Z.H, Totton, R., & Shariff, A. (2015). Negative stereotypes cause Christians to underperform in and disidentify with science. *Social Psychological and Personality Science*, *6*, 959-967. doi: 10.1177/1948550615598378

Schulz-Hardt, S., Frey, D., Lüthgens, C., & Moscovici, S. (2000). Biased information search in group decision making. *Journal of Personality and Social Psychology*, *78*, 655-669.

Stone, J., Lynch, C. I., Sjomeling, M., & Darley, J. M. (1999). Stereotype threat effects on black and white athletic performance. *Journal of Personality and Social Psychology*, *77*, 1213.

Tan, J. H., & Vogel, C. (2008). Religion and trust: An experimental study. *Journal of Economic Psychology*, *29*, 832-848. doi: 10.1016/j.joep.2008.03.002

Yancey, G. (2010). Who has religious prejudice? Differing sources of anti-religious animosity in the United States. *Review of Religious Research*, *52*, 159-171.

Yancey, G. A. (2011). *Compromising scholarship: Religious and political bias in American higher education*. Waco, Texas: Baylor University Press.

Chapter II

Charlton, B. G. (2009). Why are modern scientists so dull? How science selects for perseverance and sociability at the expense of intelligence and creativity. *Medical Hypotheses*, *72*, 237–243. doi:10.1016/j.mehy.2008.11.020

Dar-Nimrod, I., & Heine, S. J. (2006). Exposure to scientific theories affects women's math performance. *Science, 314,* 435.

Eilam, B., Zeidner, M., & Aharon, I. (2009). Student conscientiousness, self-regulated learning, and science achievement: An explorative field study, *46*, 420–432. doi:10.1002/pits

Ferguson, R. F. (2003). Teachers' perceptions and expectations and the Black-White test score gap. *Urban Education*, *38*, 460-507.

Gallup Poll (2016). Religion. Retrieved from http://www.gallup.com/poll/1690/religion.aspx

Gervais, W. M., & Norenzayan, A. (2012). Analytic thinking promotes religious disbelief. *Science*, *336*, 493–496. doi:10.1126/science.1215647

Gorsuch, R. L., & McPherson, S. E. (1989). Intrinsic/extrinsic measurement: I/E-revised and single-item scales. *Journal for the Scientific Study of Religion*, 348-354.

Greenwald, A. G., & Banaji, M. R. (1995). Implicit social cognition: attitudes, self-esteem, and stereotypes. *Psychological Review*, *102*, 4.

Greenwald, A. G., Poehlman, T. A., Uhlmann, E. L., & Banaji, M. R. (2009). Understanding and using the Implicit Association Test: III. Meta-analysis of predictive validity. *Journal of Personality and Social Psychology*, *97*, 17.

Han, H. A., Czellar, S., Olson, M. A., & Fazio, R. H. (2010). Malleability of attitudes or malleability of the IAT? *Journal of Experimental Social Psychology*, *46*, 286-298.

Hofmann, W., Gawronski, B., Gschwendner, T., Le, H., & Schmitt, M. (2005). A meta-analysis on the correlation between the Implicit Association Test and explicit self-report measures. *Personality and Social Psychology Bulletin*, *31*, 1369-1385.

Karpinski, A., & Hilton, J.L. (2001). Attitudes and the Implicit Association Test. *Journal of Personality and Social Psychology, 81*, 774–788.

Lewis, G. J., Ritchie, S. J., & Bates, T. C. (2011). The relationship between intelligence and multiple domains of religious belief: Evidence from a large adult US sample. *Intelligence*, *39*, 468–472. doi:10.1016/j.intell.2011.08.002

Lynn, R., Harvey, J., & Nyborg, H. (2009). Average intelligence predicts atheism rates across 137 nations. *Intelligence*, *37*, 11–15. doi:10.1016/j.intell.2008.03.004

Olson, M. A., Fazio, R. H., & Hermann, A. D. (2007). Reporting tendencies underlie discrepancies between implicit and explicit measures of self-esteem. *Psychological Science*, *18*, 287-291.

Pennycook, G., Cheyne, J. A., Seli, P., Koehler, D. J., & Fugelsang, J. a. (2012). Analytic cognitive style predicts religious and paranormal belief. *Cognition*, *123*, 335–346. doi:10.1016/j.cognition.2012.03.003

Rounding, K., Lee, A., Jacobson, J. A., & Ji, L.-J. (2012). Religion replenishes self-control. *Psychological Science*, *23*, 635–642. doi:10.1177/0956797611431987

Saroglou, V. (2002). Religion and the five factors of personality: A meta-analytic review.

Personality and Individual Differences, *32*, 15–25. doi:10.1016/S0191-8869(00)00233-6

Shenhav, A., Rand, D. G., & Greene, J. D. (2012). Divine intuition: Cognitive style influences belief in God. *Journal of Experimental Psychology: General*, *141*, 423–428. doi:10.1037/a0025391

Smith, C.T. & Nosek, B. A. (2012). Ambivalence and implicit-explicit discrepancy are not the same construct. Retrieved from https://ssrn.com/abstract=2137855 or http://dx.doi.org/10.2139/ssrn.2137855

Son Hing, L. S., Chung-Yan, G., Grunfeld, R., Robichaud, L., & Zanna, M. P. (2005). Exploring the discrepancy between implicit and explicit prejudice: A test of aversive racism theory. In J. P. Forgas, K. Williams, & S. Latham (Eds.), Social motivation: Conscious and unconscious processes (pp. 274-293). New York, NY: Psychology Press.

Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology*, *69*, 797–811.

Zuckerman, M., Silberman, J., & Hall, J. A. (2013). The relation between intelligence and religiosity: A meta-analysis and some proposed explanations. *Personality and Social Psychology Review*, *17*, 325–354. doi:10.1177/1088868313497266

Chapter III

Balsam, K. F., Molina, Y., Beadnell, B., Simoni, J., & Walters, K. (2011). Measuring multiple minority stress: the LGBT People of Color Microaggressions Scale. *Cultural Diversity and Ethnic Minority Psychology*, *17*, 163. doi: 10.1037/a0023244

Campbell, B., & Manning, J. (2014). Microaggression and moral cultures. *Comparative Sociology, 13*, 692-726.

Capodilupo, C. M., Nadal, K. L., Corman, L., Hamit, S., Lyons, O., & Weinberg, A. (2010). The manifestation of gender microaggressions. In D. Sue (Ed.), *Microaggressions and marginality: Manifestation, dynamics, and impact* (pp. 193-216). Hoboken, N.J.: John Wiley & Sons, Inc.

Constantine, M. G., & Sue, D. W. (2007). Perceptions of racial microaggressions among Black supervisees in cross-racial dyads. *Journal of Counseling Psychology, 54,* 142–153. doi: 10.1037/0022-0167.54.2.142

Costa, P. T., & McCrae, R. R. (1992). Normal personality assessment in clinical practice: The NEO Personality Inventory. *Psychological Assessment*, *4*, 5-13.

Etzoni, A. (2014). Don't sweat the microaggressions. *The Atlantic*. Retrieved from http://www.theatlantic.com/politics/archive/2014/04/dont-sweat-the-microaggressions/360278/

Goldberg, L.R., 1992. The development of markers for the Big-Five factor structure. *Psychological Assessment*, *4*, 26. doi: 10.1037//1040-3590.4.1.26

Haidt, J. (2017). The unwisest idea on campus: Commentary on Lilienfeld (2017). *Perspectives on Psychological Science*, *12*, 176-177.

John, O., & Srivastava, S. (1999). The Big Five Trait Taxonomy: History, measurement, and theoretical perspectives. In L. Pervin (Ed.), *Handbook of personality: Theory and research* (2nd ed., pp. 102-138). New York: Guilford Press.

Joiner, T. E., Alfano, M. S., & Metalsky, G. I. (1992). When depression breeds contempt: Reassurance seeking, self-esteem, and rejection of depressed college students by their roommates. *Journal of Abnormal Psychology*, *101*, 165-173.

Lau, M. L., & Williams, C. D. (2010). Microaggression research: Methodological reviews and recommendations. In D. Sue (Ed.), *Microaggressions and marginality: Manifestation, dynamics, and impact* (pp. 313-336). Hoboken, N.J.: John Wiley & Sons, Inc.

Lilienfeld, S. O. (2017). Microaggressions: Strong claims, inadequate evidence. *Perspectives on Psychological Science*, *12*, 138-169.

Lukianoff, G. & Haidt, J. (2015). The coddling of the American mind. *The Atlantic*. Retrieved from http://www.theatlantic.com/magazine/archive/2015/09/the-coddling-of-the-american-mind/399356/

Mac Donald, H (2014). The microaggression farce. *City Journal*. Retrieved from http://www.city-journal.org/2014/24_4_racial-microaggression.html

Nadal, K. L. (2011). The Racial and Ethnic Microaggressions Scale (REMS): construction, reliability, and validity. *Journal of Counseling Psychology*, *58*, 470. doi: 10.1037/a0025193

Nadal, K. L., Griffin, K. E., Hamit, S., Leon, J., Tobio, M., & Rivera, D. P. (2012). Subtle and overt forms of islamophobia: Microaggressions toward Muslim Americans. *Journal of Muslim Mental Health*, *6*, 15-37. doi: 10.3998/jmmh.10381607.0006.203

Nadal, K. L., Griffin, K. E., Wong, Y., Hamit, S., & Rasmus, M. (2014). The impact of

racial microaggressions on mental health: Counseling implications for clients of color. *Journal of Counseling & Development*, *92*, 57-66. doi: 10.1002/j.1556-6676.2014.00130.x

Nadal, K., Issa, M., Griffin, K., Hamit, S., & Lyons, O. (2010). Religious microaggressions in the United States: Mental health implications for religious minority groups. In D. W. Sue (Ed.), *Microaggressions and marginality: Manifestation, dynamics, and impact* (pp. 287-310). Hoboken, N.J.: John Wiley & Sons, Inc.

Nadal, K. L., Issa, M. A., Leon, J., Meterko, V., Wideman, M., & Wong, Y. (2011). Sexual orientation microaggressions:"Death by a thousand cuts" for lesbian, gay, and bisexual youth. *Journal of LGBT Youth*, *8*, 234-259.

Ong, A. D., Burrow, A. L., Fuller-Rowell, T. E., Ja, N. M., & Sue, D. W. (2013). Racial microaggressions and daily well-being among Asian Americans. *Journal of Counseling Psychology*, *60*, 188.

Ong, A. D., & Burrow, A. L. (2017). Microaggressions and daily experience: Depicting life as it is lived. *Perspectives on Psychological Science*, *12*, 173-175.

Pascoe, E. A., & Smart Richman, L. (2009). Perceived discrimination and health: a meta-analytic review. *Psychological Bulletin*, *135*, 531. doi: 10.1037/a0016059

Salvatore, J., & Shelton, J. N. (2007). Cognitive costs of exposure to racial prejudice. *Psychological Science*, *18*, 810-815.

Sheridan, L. P. (2006). Islamophobia pre–and post–September 11th, 2001. *Journal of Interpersonal Violence*, *21*, 317-336. doi: 10.1177/0886260505282885

Soygüt, G., & Savaşir, I. (2001). The relationship between interpersonal schemas and depressive symptomatology. *Journal of Counseling Psychology*, *48*, 359-364. doi: 10.1037//0022-0167.48.3.359

Steele, C. M. (2010). *Whistling Vivaldi: And other clues to how stereotypes affect us (Issues of our Time)*. New York: W. W. Norton & Company.

Sue, D. W. (2010a). *Microaggressions in everyday life: Race, gender, and sexual orientation*. Hoboken, N.J.: John Wiley & Sons, Inc.

Sue, D. W. (Eds.). (2010b). *Microaggressions and marginality: Manifestation, dynamics, and impac*t. Hoboken, N.J.: John Wiley & Sons, Inc.

Sue, D. W., Capodilupo, C. M., & Holder, A. M. B. (2008). Racial microaggressions in the life experiences of Black Americans. *Professional Psychology: Research and Practice*, 39, 329–336. doi: 10.1037/0735-7028.39.3.329

Sue, D. W., Capodilupo, C. M., Torino, G. C., Bucceri, J. M., Holder, A. M. B., Nadal, K. L., & Esquilin, M. (2007). Racial microaggressions in everyday life: Implications for clinical practice. *American Psychologist*, 62, 271–286. doi: 10.1037/0003-066X.62.4.271

Torres-Harding, S. R., Andrade, A. L., & Romero Diaz, C. E. (2012). The racial microaggressions scale (RMAS): A new scale to measure experiences of racial microaggressions in people of color. *Cultural Diversity & Ethnic Minority Psychology*, *18*, 153–64. doi:10.1037/a002765

Torres, L., Driscoll, M. W., & Burrow, A. L. (2010). Racial microaggressions and psychological functioning among highly achieving African-Americans: A mixed-methods approach. *Journal of Social and Clinical Psychology*, *29*, 1074-1099. doi: 10.1521/jscp.2010.29.10.1074

Tran, A. G., & Lee, R. M. (2014). You speak English well! Asian Americans' reactions to an exceptionalizing stereotype. *Journal of Counseling Psychology*, *61*, 484.

Van Dam, N. T., & Earleywine, M. (2011). Validation of the Center for Epidemiologic Studies Depression Scale—Revised (CESD-R): Pragmatic depression assessment in the general population. *Psychiatry Research*, *186*, 128-132. doi: 10.1016/j.psychres.2010.08.018

Walton, G. M., & Cohen, G. L. (2007). A question of belonging: Race, social fit, and achievement. *Journal of Personality and Social Psychology*, *92*, 82–96. doi:10.1037/0022-3514.92.1.82

Walton, G. M., & Cohen, G. L. (2011). A brief social-belonging intervention improves academic and health outcomes of minority students. *Science, 331*, 1447–51. doi:10.1126/science.1198364

Zamudio-Suaréz, Fernanda (2016). What Happens When Your Research Is Featured on 'Fox & Friends.' *The Chronicles of Higher Education*. Retrieved from http://chronicle.com/article/What-Happens-When-Your/236949

Chapter IV

Aiken, L. S., & West, S. G. (1991). *Multiple Regression: Testing and Interpreting Interactions*. Thousand Oaks, CA: Sage Publications.

Cheryan, S., Plaut, V. C., Davies, P. G., & Steele, C. M. (2009). Ambient belonging: How stereotypical cues impact gender participation in computer science. *Journal of Personality and Social Psychology, 97,* 1045-1060.

Marsh, H. W., & O'Neill, R. (1984). Self-description questionnaire III: The construct validity of multidimensional self-concept ratings by late adolescents. *Journal of Educational Measurement, 21,* 153-174.

Murphy, M. C., Steele, C. M., & Gross, J. J. (2007). Signaling threat: How situational cues affect women in math, science, and engineering settings. *Psychological Science, 18,* 879-885.

Nosek, B. A., Banaji, M. R., & Greenwald, A. G. (2002). Math=male, me=female, therefore math≠me. *Journal of Personality and Social Psychology, 83,* 44-59.

Preston, J. L., & Epley, N. (2009). Science and God: An automatic opposition between ultimate explanations, *Journal of Experimental Social Psychology, 45,* 238-241.

Rydell, R. J., Rydell, M. T., & Boucher, K. L. (2010). The effect of negative performance stereotypes on learning. *Journal of Personality and Social Psychology*, *99*, 883–896. doi:10.1037/a0021139

Schmader, T. Gender identification moderates stereotype threat effects on women's math performance. *Journal of Experimental Social Psychology, 38,* 194-201.

Spencer, S. J., Steele, C. M., & Quinn, D. M. (1999). Stereotype threat and women's math performance. *Journal of Experimental Social Psychology, 35,* 4-28.

Steele, C. M. (1997). A threat in the air: How stereotypes shape intellectual identity and performance. *American Psychologist*, *52*, 613.

Stephens, N. M., Fryberg, S. A., Markus, H. R., Johnson, C. S., & Covarrubias, R. (2012). Unseen disadvantage: how American universities' focus on independence undermines the academic performance of first-generation college students. *Journal of Personality and Social Psychology*, *102*, 1178.

Chapter V

American Religious Identity Survey (2013). Religious, spiritual and secular : The emergence of three distinct worldviews among American college students: A report based on the ARIS 2013 national college student survey.

Aud, S., Hussar, W., Kena, G., Bianco, K., Frohlich, L., Kemp, J., et al. (2011). The condition of education 2011 (NCES 2011-033). U. S. Department of Education, National Center for Education Statistics. Washington, DC: Government Printing Office.

Cohen, G. L., & Garcia, J. (2008). Identity, belonging, and achievement: A model, interventions, implications. *Current Directions in Psychological Science*, *17*, 365–369. doi:10.1111/j.1467-8721.2008.00607.x

Cheryan, S., Siy, J. O., Vichayapai, M., Drury, B. J., & Kim, S. (2011). Do female and male role models who embody STEM stereotypes hinder women's anticipated success in STEM? *Social Psychological and Personality Science*, *2*, 656–664. doi:10.1177/1948550611405218

Cohen, G. L., Garcia, J., Apfel, N., & Master, A. (2006). Reducing the racial achievement gap: A social–psychological intervention. *Science, 313,* 1307–1310. doi:10.1126/science.1128317

Cook, J. E., Purdie-Vaughns, V., Garcia, J., & Cohen, G. L. (2012). Chronic threat and contingent belonging: Protective benefits of values affirmation on identity development. *Journal of Personality and Social Psychology, 102,* 479-496.

Curlin, F. A Odell, S. V, Lawrence, R. E., Chin, M. H., Lantos, J. D., Meador, K. G., & Koenig, H. G. (2007). The relationship between psychiatry and religion among U.S. physicians. *Psychiatric Services, 58*, 1193–1198. doi:10.1176/appi.ps.58.9.1193

Dasgupta, N. (2011). Ingroup experts and peers as social vaccines who inoculate the self-concept: The stereotype inoculation model. *Psychological Inquiry, 22*, 231-246. doi:10.1080/1047840X.2011.607313

Davies, P. G., Spencer, S. J., Quinn, D. M., & Gerhardstein, R. (2002). Consuming images: How television commercials that elicit stereotype threat can restrain women academically and professionally. *Personality and Social Psychology Bulletin, 28,* 1615–1628.

Ehrlinger, J., & Dunning, D. (2003). How chronic self-views influence (and potentially mislead) estimates of performance. *Journal of Personality and Social Psychology*, *84*, 5–17. doi:10.1037/0022-3514.84.1.5

Ginther, D. K., Schaffer, W. T., Schnell, J., Masimore, B., Liu, F., Haak, L. L., & Kington, R. (2011). Race, ethnicity, and NIH research awards. *Science*, *333*, 1015-1019.

Higher Education Research Institute (2014). *The American freshman: National norms*. Retrieved from http://heri.ucla.edu/PDFs/pubs/TFS/Norms/Monographs/TheAmericanFreshman2011.pdf

Higher Education Research Institute (2007). Spiritual changes in students during the undergraduate years: New longitudinal study shows growth in spiritual qualities from freshman to junior years. Retrieved from http://spirituality.ucla.edu/docs/news/report_backup_dec07release_12.18.07.pdf

Kessel, C., & Nelson, D. J. (2011). Statistical trends in women's participation in science: Commentary on Valla and Ceci (2011). *Perspectives on Psychological Science, 6,* 147-149. doi:10.1177/1745691611400206

Lewis, K. L., & Hodges, S. D. (2015). Expanding the concept of belonging in academic domains: Development and validation of the Ability Uncertainty Scale. *Learning and Individual Differences*, *37*, 197–202. doi:10.1016/j.lindif.2014.12.002

Marx, D. M., & Goff, P. A. (2005). Clearing the air: The effect of experimenter race on target's test performance and subjective experience, *British Journal of Social Psychology, 44,* 644-657.

Marx, D. M., & Roman, J. S. (2002). Female role models: Protecting women's math test performance. *Personality and Social Psychology Bulletin, 28,* 1183–1193. doi:10.1177/01461672022812004

Marx, D. M., Stapel, D. A., & Muller, D. (2005). We can do it: The interplay of construal orientation and social comparison under threat. *Journal of Personality and Social Psychology, 88,* 432–446. doi: 10.1037/0022-3514.88.3.432

McIntyre, R. B., Paulson, R. M., & Lord, C. G. (2003). Alleviating women's mathematics stereotype threat through salience of positive group achievements. *Journal of Experimental Social Psychology, 39,* 83–90. doi:10.1016/S0022-1031(02)00513-9

Miyake, A., Kost-Smith, L. E., Finkelstein, N. D., Pollock, S. J., Cohen, G. L., & Ito, T. A. (2010). Reducing the gender achievement gap in college science: A classroom study of values affirmation. *Science, 330,* 1234–1237. doi:10.1126/science.1195996

Moss-Racusin, C. A., van der Toorn, J., Dovidio, J. F., Brescoll, V. L., Graham, M. J., & Handelsman, J. (2012). Scientific diversity interventions. *Science, 343,* 615-616.

Moss-Racusin, C. A., van der Toorn, J., Dovidio, J. F., Brescoll, V. L., Graham, M. J., & Handelsman, J. (2014). Scientific diversity interventions. *Science*, *343*, 615–616. doi:10.1126/science.1245936

National Center for Educational Statistics (2012). Average science literacy scores of 15-year-old students and percentage attaining science literacy proficiency levels, by country or other education system: 2012. Retrieved from https://nces.ed.gov/programs/digest/d13/tables/dt13_602.70.asp

Press, W. H., & Leshner, A. I. (2013). Welcome. Retrieved from http://www.aaas.org/sites/default/files/AR13_welcome-letter.pdf

Reuben, E., Sapienza, P., & Zingales, L. (2014). How stereotypes impair women's

careers in science. *Proceedings of the National Academy of Sciences of the United States of America*, *111*, 4403–8. doi:10.1073/pnas.1314788111

Scheitle, C. P. &, Ecklund, E. H. (2017). The influence of science popularizers on the publics' view of religion and science: An experimental assessment. *Public Understanding of Science*. doi: 10.1177/0963662515588432

Shapiro, J. R., Williams, A. M., & Hambarchyan, M. (2013). Are all interventions created equal? A multi-threat approach to tailoring stereotype threat interventions. *Journal of Personality and Social Psychology*, *104*, 277–288.

Sherkat, D. E. (2007). Religion and higher education: The good, the bad, and the ugly. In *Social Science Research Council Online Forum*. Retrieved from http://religion.ssrc.org/reforum/Sherkat.pdf

Sherman, D. K., Hartson, K. A., Binning, K. R., Purdie-Vaughns, V., Garcia, J., Taborsky-Barba, S., … & Cohen, G.L. (2013). Deflecting the trajectory and changing the narrative : How self-affirmation etc. Affects Academic Performance and Motivation Under Identity Threat. *Journal of Personality and Social Psychology*, *104*, 591–618. doi:10.1037/a0031495

Smith, J. L., Lewis, K. L., Hawthorne, L., & Hodges, S. D. (2012). When trying hard isn't natural: Women's belonging with and motivation for male-dominated STEM fields as a function of effort expenditure concerns. *Personality and Social Psychology Bulletin*, *39*, 131–143. doi:10.1177/0146167212468332

Steele, C. M., Spencer, S. J., & Aronson, J. (2002). Contending with images of one's group: the psychology of stereotype and social identity threat. *Advances in Experimental Social Psychology*, *34*, 379–440. doi:10.1016/S0065-2601(02)80009-0

Stephens, N. M., Hamedani, M. G., & Destin, M. (2014). Closing the social class achievement gap: A diversity education intervention improves the academic performance of first-generation college students and the college transition for all students. *Psychological Science*, 26, 1–36. doi:10.1177/0956797613518349