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Will M. Gervais¹

Abstract

Although prejudice is typically positively related to relative outgroup size, four studies found converging evidence that perceived atheist prevalence reduces anti-atheist prejudice. Study 1 demonstrated that anti-atheist prejudice among religious believers is reduced in countries in which atheists are especially prevalent. Study 2 demonstrated that perceived atheist prevalence is negatively associated with anti-atheist prejudice. Study 3 demonstrated a causal relationship: Reminders of atheist prevalence reduced explicit distrust of atheists. These results appeared distinct from intergroup contact effects. Study 4 demonstrated that prevalence information decreased implicit atheist distrust. The latter two experiments provide the first evidence that mere prevalence information can reduce prejudice against any outgroup. These findings offer insights about anti-atheist prejudice, a poorly understood phenomenon. Furthermore, they suggest both novel directions for future prejudice research and potential interventions that could reduce a variety of prejudices.

Keywords

prejudice, atheism, stereotyping, intergroup conflict, religious beliefs, contact

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For more than 50 years, researchers have recognized a *positive prejudice–outgroup size* relationship: Prejudice increases against groups that have more members. To the extent that this finding reflects a general feature of prejudice, then positive prejudice–outgroup size relationships should be widespread across different targets of prejudice. However, a sociofunctional approach to prejudice (e.g., Cottrell & Neuberg, 2005) suggests that different outgroups are perceived to pose different threats and evoke different reactions; one important as yet untested extension of this perspective is that different types of prejudice might therefore be differentially affected by contextual factors such as relative outgroup size. The present article focuses on prejudice against atheists, a type of prejudice that has only recently attracted scientific attention, and tests the novel hypothesis that increases in actual and perceived atheist prevalence could instead lead to *decreased* anti-atheist prejudice. This possibility represents a stark deviation from previous research relating prejudice to relative outgroup size and has important implications for the social psychological understanding of how contextual factors influence different prejudices.

man, a woman, a Mormon man, and a Hispanic man. In general, the American public appears to embrace this diversity in politics. In a February 2007 Gallup poll, nearly 95% of respondents said that they would vote for a qualified Black candidate from their own political party and were supportive of a wide range of potential candidates including female, Jewish, and Mormon politicians. Only one group could not garner a majority vote: atheists. In a September 2006 Gallup poll, 84% of Americans reported that the country is not ready for an atheist president. These polls illustrate a persistent exclusion of people who do not believe in God, which is especially remarkable because as a group atheists are neither powerful nor conspicuous.

But they are numerous. Globally, atheists are 58 times more numerous than Mormons, 41 times more numerous than Jewish people, and twice as numerous as Buddhists; nonbelievers constitute the fourth largest religious group in the world, trailing only Christians, Muslims, and Hindus (Zuckerman, 2007). Despite the prevalence of atheists and

Atheists: Unpopular and Numerous

The 2008 presidential election presented a fascinating study of social tolerance in America. Candidates included a Black

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the popular attention atheism is receiving (e.g., Dawkins, 2006), there is little scientific research on atheism and attitudes toward atheists. Yet religious belief is declining in the postindustrial world (Norris & Inglehart, 2004), and the percentage of Americans with no religious affiliation has nearly doubled since 1990 (Kosmin & Keysar, 2008). Under billboards reading, for example, “Don’t Believe in God? You Are Not Alone,” American atheists are increasingly making their numbers known (Goodstein, 2009). What effects might the increasing numbers and visibility of atheists have on attitudes toward atheists? This straightforward question has important implications not only for the specific social psychology of atheism and attitudes toward atheists but also for the broader social psychological understanding of the relationship between prejudice and perceived outgroup size, possibly suggesting a novel approach to prejudice reduction.

More People, More Prejudice?

At first glance, it seems likely that an increase in the number of atheists would lead to an increase in prejudice against atheists. More than half of a century ago, Allport (1954) noted that prejudice increases with relative outgroup size. For example, anti-Black prejudice is stronger where Black people hold a larger relative share of local populations in the United States (e.g., Fosset & Kiecolt, 1989; Giles & Evans, 1986; Pettigrew, 1959). The disparity in racial attitudes between North and South in the United States is statistically nonsignificant after local Black population share is controlled (Taylor, 1998), and a similar (albeit attenuated) pattern emerges across almost 20 years of General Social Surveys data (Quillian, 1996). Although the vast majority of this research has focused on racial attitudes, studies find positive relationships between outgroup size and prejudice against foreigners in Germany (Semyonov, Rajzman, Yom-Tov, & Schmidt, 2004) and anti-immigrant prejudice throughout Europe (Quillian, 1995).

Combined, these data illustrate that for some outgroups, prejudice increases in concert with increases in relative group size. This is a compelling pattern from a realistic conflict perspective (e.g., Sherif, Harvey, White, Hood, & Sherif, 1961). All else equal, a competing group becomes even more threatening if it has more members. Although this work has largely focused on racial attitudes, it may reflect a more general feature of prejudice. If this is the case, then positive prejudice–relative outgroup relationships should be ubiquitous.

A Sociofunctional Framework

On the other hand, recent social psychological research reveals that different outgroups are perceived to pose categorically and functionally distinct types of threats (Cottrell & Neuberg, 2005; Schaller & Neuberg, 2008), leading to different cognitive and affective outcomes (e.g., Ackerman

et al., 2006; Cottrell & Neuberg, 2005; Tapias, Glaser, Keltner, Vasquez, & Wickens, 2007). Different outgroups provoke different prejudices. This may, in turn, imply that different prejudices might have different relationships with contextual factors such as relative outgroup size: Although a wide range of potential threats might be exaggerated if they are associated with larger outgroups, different classes of perceived threats might be differentially affected by perceptions of outgroup size.

Most research relating prejudice to relative outgroup size comes from investigations of anti-Black prejudice, and anti-Black prejudice appears almost ideally suited for positive prejudice–outgroup size relationships. Cottrell and Neuberg (2005) found that African Americans were seen by European American college students as particularly threatening to physical safety and, to a lesser extent, property. Fear was a prominent emotional reaction. It is unsurprising that prejudice is positively associated with the relative size of a feared group that is seen as a threat to safety and property, and prejudice is probably positively associated with the relative size of similarly viewed groups. However, the sociofunctional perspective implies that prejudices based on different perceived threats might be differentially affected by outgroup prevalence. What, then, are the sociofunctional origins of anti-atheist prejudice?

Distrust and Anti-Atheist Prejudice

Although discussions of atheism have become increasingly common in popular culture, researchers have only recently turned their empirical attention to atheism and attitudes toward atheists (e.g., Beit-Hallahmi, 2006; Edgell, Gerteis, & Hartmann, 2006; Gervais, Shariff, & Norenzayan, 2010; Hunsberger & Altemeyer, 2006; Zuckerman, 2008). These research efforts have yielded some tantalizing insights into the logic underlying this peculiarly strong prejudice against a group of people who are not collectively powerful, coherent, or visible. In addition to displaying an unwillingness to vote for politicians who do not believe in God, American respondents rated atheists as the group that least shares their vision of America and the group that they would most disapprove of their children marrying (Edgell et al., 2006). These authors note that although most stigmatized groups have become more accepted over the past several decades, this has been less true for atheists; as a result, atheists now rank at the bottom of large-scale polls of cultural inclusion. This may indicate that antipathy toward atheists is not the simple result of general intergroup conflict processes.

Instead, specific distrust appears to be the functional basis of anti-atheist prejudice. Human sociality and interdependence make trustworthiness a uniquely valued characteristic in others (Cottrell, Neuberg, & Li, 2007). However, trustworthiness is not always easy to assess directly outside of specific “strain test” situations (Simpson, 2007). This leads people to infer the trustworthiness of others based on indirect

cues. In particular, religious people use the religious beliefs of others as heuristic cues of trustworthiness, equating religiosity with moral standing (e.g., Norenzayan & Shariff, 2008; Sosis, 2005). Individuals who believe in supernatural agents capable of witnessing and punishing moral transgressions are viewed as more motivated to inhibit their selfish tendencies; this, in turn, promotes trust of “God-fearing” believers (Norenzayan & Shariff, 2008). One study vividly illustrates this pattern. Tan and Vogel (2008) had subjects participate with each other in a classic behavioral economic game that measures trust. Participants were more likely to entrust their money to an anonymous stranger if they found out that the stranger was strongly religious.

If trust is extended to religious individuals, it may be withheld from atheists, implying that anti-atheist prejudice should be characterized by feelings of distrust (Beit-Hallahmi, 2010; Gervais et al., 2010). Consistent with this hypothesis, nearly half of Americans believe that moral living is *impossible* without belief in God (Pew Research Center, 2002). More focused laboratory investigations (Gervais et al., 2010) reveal that a description of a criminally untrustworthy individual is seen as more representative of atheists than of Christians, Muslims, homosexuals, Jewish people, or feminists; only rapists were distrusted to a comparable degree as were atheists in this investigation. Furthermore, belief in God is strongly and significantly associated with implicit distrust (though not dislike) of atheists and religious participants are particularly likely to discriminate against atheists when choosing candidates for high-trust jobs (Gervais et al., 2010). Combined, these data indicate that distrust is central to anti-atheist prejudice.

Although prejudice characterized by fear is positively related to outgroup size, prejudice characterized by distrust may instead be negatively related to outgroup size. There is some inherent tension between distrust of atheists on one hand and the collective inconspicuousness of atheists on the other hand. One would expect that such an untrustworthy group would be readily apparent, as their widespread immorality would leave obvious effects. These two facts could be reconciled if atheists were rare: Even an untrustworthy group can escape notice if it is small enough. But atheist distrust may not be able to persist if atheists are both inconspicuous and believed to be numerous. In other words, it is possible that knowledge that atheists are both inconspicuous and numerous could force a reappraisal of the incompatible view that they are untrustworthy. This pattern would lead to a negative relationship between anti-atheist prejudice and perceived atheist prevalence.

Present Studies and Hypotheses

Across four studies, I hypothesized that atheist prevalence would be associated with reduced anti-atheist prejudice. Although this prediction deviates from a large body of research demonstrating a positive relationship between prejudice

and relative outgroup size, it is consistent with the limited available evidence on anti-atheist prejudice around the world. Atheists are relatively rare in North America, and substantial anti-atheist prejudice has been demonstrated both in the United States (Edgell et al., 2006) and in Canada (Gervais et al., 2010). On the other hand, Zuckerman (2008) presents some evidence that atheists are numerous and anti-atheist prejudice is practically nonexistent in Denmark and Sweden, where religiousness is viewed as orthogonal to trustworthiness. In North America, anti-atheist prejudice is prevalent and atheists are rare, whereas in Scandinavia anti-atheist prejudice is rare and atheists are prevalent, representing a sharp departure from the typical pattern reported for prejudice against conspicuous outgroups such as Black people in the United States. These limited investigations lend empirical support to the prediction that anti-atheist prejudice might be reduced where atheists are common, leading to several more specific hypotheses.

First, Study 1 examined the worldwide relationship between anti-atheist prejudice and actual atheist prevalence at the country level and tested the hypothesis that anti-atheist prejudice among believers would be negatively associated with atheist prevalence around the globe. Second, Study 2 used a survey of undergraduates at a major North American university to test the hypothesis that explicit anti-atheist prejudice would be negatively related to the perceived prevalence of atheists. Because anti-atheist prejudice stems from distrust, both of these studies used prejudice measures that rely heavily on the perceived trustworthiness of atheists. Third, Study 3 used an experimental design to determine the causal nature of these relationships, testing the hypothesis that learning that atheists are quite common would decrease explicit distrust of atheists. This design directly addressed the alternative explanation that the present findings might merely reflect intergroup contact effects rather than a novel avenue to prejudice reduction. Finally, Study 4 extended Study 3 by testing the hypothesis that learning about atheist prevalence would reduce implicitly measured distrust of atheists.

Study 1

Overview

In contrast to established trends in ethnic prejudice, prejudice against atheists may be reduced where atheists are more common. To date, systematic research on anti-atheist prejudice is based entirely on North American samples, though Zuckerman (2008) presents some qualitative evidence that atheists are both common and tolerated in Scandinavia. To explore the global relationship between anti-atheist prejudice and atheist prevalence, I examined anti-atheist prejudice across 54 countries with diverse religious, socioeconomic, and political backgrounds, predicting that believers would show reduced anti-atheist prejudice in countries with greater numbers of atheists.

I controlled for a number of variables at both the individual and country levels. To address the banal alternative explanation that anti-atheist prejudice is reduced in countries with lots of atheists simply because atheists do not dislike themselves, anti-atheist prejudice was measured only among religious believers in this study. Other individual-level controls included age, sex, educational attainment, income, liberalism or conservatism, and church attendance. These are classic control measures, and church attendance is an independent predictor of other forms of religious conflict and intolerance (Ginges, Hansen, & Norenzayan, 2009; Hansen & Norenzayan, 2006).

At the country level, I controlled for general social and economic development, which is associated with existential security, secularization, and reduced religious belief (Norris & Inglehart, 2004), all of which may relate to anti-atheist prejudice. Finally, I controlled for individualism/collectivism at the country level, which is perhaps the most widely studied dimension of cultural differences (e.g., Kashima et al., 1995; Triandis, 1995). In addition, collectivism is associated with both religiosity (Cukur, Guzman, & Carlo, 2004) and attitudes toward outgroups (e.g., Brewer, 1999; Triandis, 1995).

Study 1 included a series of analyses that both revealed the relationship between atheist prevalence and anti-atheist prejudice among believers and tested whether additional important international and cultural differences are plausible alternative explanations. Specifically, Study 1 tested the hypothesis that atheist prevalence is negatively related to anti-atheist prejudice worldwide.

Method and Measures

I evaluated the relationship between anti-atheist prejudice and the proportion of atheists across countries using Wave 4 of the World Values Survey (WVS), carried out between 1999 and 2004; the 2008 United Nations Human Development Index (HDI); and a cross-cultural measure of individualism/collectivism. In sum, 54 countries had scores for anti-atheist prejudice, atheist prevalence, and HDI; 39 countries had scores for anti-atheist prejudice, atheist prevalence, HDI, and individualism/collectivism.

Anti-atheist prejudice among believers. All data were obtained from the WVS website (www.worldvaluesurvey.org). Only respondents who believe in God ($N = 40,271$) were included in the analyses that produced anti-atheist prejudice scores for each country. A single WVS item assessed agreement with the statement, "Politicians who don't believe in God are unfit for public office." Consistent with the present theoretical framework, this single item is a "trust-biased" measure of anti-atheist prejudice rather than a more general attitudinal measure. To statistically control for numerous important individual differences, I regressed age, sex, educational attainment, income, liberalism/conservatism, and church

attendance on the anti-atheist prejudice item, saving unstandardized residuals. The residual score, averaged for each country, yielded a single variable of anti-atheist prejudice among believers by country with numerous individual controls. Higher scores indicate more anti-atheist prejudice. Consistent with extant research, mean residualized anti-atheist prejudice values were higher in the United States (0.18) and Canada (-0.23) than in Sweden (-0.73) and Denmark (-1.11).

Atheist prevalence. A single WVS item asked respondents whether or not they agreed with the statement "I believe in God," with options *yes*, *no*, and *I don't know*. The percentage of respondents who responded *no* within each country formed a single variable of atheist prevalence by country. There was a great deal of variability in this measure, with atheist prevalence ranging from 0.73% (Indonesia and Algeria) to 75.9% (Vietnam).

HDI. The HDI (<http://hdr.undp.org/en/statistics/>) includes a single score for each country. Higher numbers indicate greater degrees of socioeconomic development, with values in this data set ranging from .47 (Tanzania and Nigeria) to .97 (Iceland).

Individualism/collectivism. Individualism/collectivism scores were taken from Hofstede's website (www.geert-hofstede.com). This measure included a single score for 39 countries in the present dataset. Scores ranged from 14 (Indonesia) to 91 (United States), with larger numbers indicating greater levels of individualism.

Results and Discussion

I conducted a series of three analyses with two primary goals. First, a straightforward correlation analysis was used to determine the nature of the relationship between atheist prevalence and anti-atheist prejudice. Second, two multiple regression analyses with additional control measures tested whether any observed relationship between atheist prevalence and anti-atheist prejudice was explained by socioeconomic development or individualism/collectivism, respectively.

Was atheist prevalence positively or negatively related to anti-atheist prejudice? As hypothesized, atheist prevalence was negatively related to anti-atheist prejudice, $r(52) = -.45$, $p = .001$. Anti-atheist prejudice was reduced where atheists are more common.

Was the negative relationship between atheist prevalence and anti-atheist prejudice attributable to differences in socioeconomic development? In a two-predictor regression model, atheist prevalence and HDI accounted for 42.4% (adjusted R^2) of the variance in anti-atheist prejudice, $F(2, 51) = 20.53$, $p < .001$. As hypothesized, atheist prevalence exerted a significant unique effect on anti-atheist prejudice, controlling for HDI, $\beta = -.26$, $t = 2.33$, $p = .02$. HDI significantly predicted anti-atheist prejudice, controlling for atheist prevalence, $\beta = -.53$, $t = 4.71$, $p < .001$. Even after controlling for

Table 1. The Negative Attitudes Toward Atheists Scale

Item	Item–total correlation	Factor Loading
I would be uncomfortable with an atheist teaching my child	.651	.759
I strongly believe that church and state should be kept separate ^a	.511	.632
Societies function better if everyone believes in God	.769	.854
Religion facilitates moral behavior in a way that nothing else can	.619	.736
I would prefer to spend time with people who are religious believers	.658	.766
I would not at all be bothered by a Prime Minister who did not have religious beliefs ^a	.553	.670
In times of crisis, I am more inclined to trust people who are religious	.603	.717

Note: Data based on $N = 218$ participants (from Gervais & Shariff, 2010).

a. Reverse scored.

socioeconomic development, anti-atheist prejudice was reduced where atheists are more common.

Was the negative relationship between atheist prevalence and anti-atheist prejudice attributable to differences in individualism/collectivism? In a separate two-predictor regression model, atheist prevalence and individualism/collectivism accounted for 42.5% (adjusted R^2) of the variance in anti-atheist prejudice, $F(2, 36) = 15.06, p < .001$. As hypothesized, atheist prevalence exerted a significant unique effect on anti-atheist prejudice, $\beta = -.28, t = 2.17, p = .04$. Individualism/collectivism significantly predicted anti-atheist prejudice, controlling for atheist prevalence, $\beta = -.55, t = 4.37, p < .001$. Even after controlling for individualism/collectivism, anti-atheist prejudice was reduced where atheists are more common.

Summary

Atheist prevalence was negatively related to anti-atheist prejudice among believers. These effects were not attributable to individual differences in age, sex, educational attainment, income, liberalism/conservatism, or church attendance. Nor were they attributable to international differences in socioeconomic development or individualism/collectivism. Although both of these important international differences independently predicted anti-atheist prejudice, they did not explain the negative relationship between atheist prevalence and anti-atheist prejudice.

Study 2

Overview

Study 1 was the first to examine attitudes toward atheists worldwide, finding that actual atheist prevalence predicts reduced anti-atheist prejudice. Study 2 moved from the international level of analysis to the individual level of analysis. Because atheism is a concealable stigma (i.e., not a stigma that is readily apparent to observers; see Goffman, 1963), however, it may be difficult for people to determine the actual prevalence of atheists.

Atheists may be common or rare, but what matters psychologically is whether people *perceive* atheists to be common or rare. This study investigated the relationship between *perceived* atheist prevalence and anti-atheist prejudice. In addition, this study controlled belief in God and belief in a dangerous world (BDW), two factors known to contribute to specific anti-atheist prejudice and prejudice in general, respectively.

Religiosity is a powerful predictor of anti-atheist prejudice (Edgell et al., 2006), and belief in God specifically appears to be a potent contributor to atheist distrust (Gervais et al., 2010). By including belief in God as an additional predictor, this study controls for a powerful predictor of anti-atheist prejudice that is probably also related to perceived atheist prevalence.

BDW measures general concerns about dangers in the world and is known to relate to prejudice and stereotyping (Altemeyer, 1988; Duckitt, Wagner, du Plessis, & Birum, 2002; Schaller, Park, & Mueller, 2003). By including BDW, this study distinguishes between specific distrust of atheists and more general fears about social instability—fears that are known to contribute to other prejudices. Thus, the present study focused on how specific perceptions of atheist prevalence, independent of more general perceptions of threats in the world, relate to anti-atheist prejudice. Study 2 tested the hypothesis that explicit anti-atheist prejudice is negatively related to perceived atheist prevalence, controlling for belief in God and BDW.

Method and Measures

A total of 104 undergraduates (78% female, mean age = 20.19) completed a web-based questionnaire for extra credit. Participants completed measures of explicit anti-atheist prejudice, perceived atheist prevalence, belief in God, and BDW.

Anti-atheist prejudice. The seven-item Negative Attitudes Toward Atheists scale ($\alpha = .84$; see Table 1 for items) provides a reliable and valid measure of explicit anti-atheist prejudice (Gervais & Shariff, 2010). The scale exhibits high internal consistency and taps a single factor. As in Study 1,

this measure closely taps distrust of atheists: In previous research, measures of implicit atheist distrust—but not implicit measures of general negative attitudes—predicted higher scores on the scale (Gervais et al., 2010).

Perceived atheist prevalence. Participants rated how prevalent they found atheists (among a series of filler groups such as homosexuals and vegetarians) on a 7-point scale ranging from 1 (*not at all common*) to 7 (*very common*). Overall, participants rated atheists as somewhat common ($M = 4.91$, $SD = 1.53$).

Belief in God. Belief in God was measured with a single face-valid item. Participants rated their agreement with the statement “I believe in God” on scale from 1 (*strongly disagree*) to 7 (*strongly agree*).

BDW. The Belief in a Dangerous World scale (Altemeyer, 1988) consists of 12 questions ($\alpha = .81$) that measure attitudes about physical threat and social chaos. A sample item is “There are many dangerous people in our society who will attack someone out of pure meanness, for no reason at all.”

Results and Discussion

The central hypothesis of Study 2 was that perceived atheist prevalence would predict reduced anti-atheist prevalence, controlling for belief in God and BDW. In a three-predictor regression model, perceived atheist prevalence, belief in God, and BDW accounted for 40.2% (adjusted R^2) of the variance in anti-atheist prejudice, $F(3, 100) = 24.12$, $p < .001$. As hypothesized, perceived atheist prevalence significantly predicted anti-atheist prejudice such that anti-atheist prejudice was attenuated among participants who thought atheists more common, controlling for belief in God and BDW, $\beta = -.22$, $t = 2.84$, $p = .005$. Belief in God and BDW independently predicted increased anti-atheist prejudice, $\beta = .51$, $t = 6.55$, $p < .001$ and $\beta = .31$, $t = 3.92$, $p < .001$. Even after controlling for variables known to contribute to prejudice in general (BDW) and specific prejudice against atheists (belief in God), participants who thought that atheists were more common viewed them more positively.

Study 3

Overview

Study 3 extended the findings of the first two studies in a number of important ways, yielding clearer conclusions about causation and evaluating alternative explanations. The first two studies demonstrated that anti-atheist prejudice is reduced in cultures where atheists are common and among individuals who think that atheists are common, suggesting that perceptions of atheist prevalence might reduce prejudice. To determine the causal relationship between the

perceived prevalence of atheists and anti-atheist prejudice, Study 3 experimentally manipulated whether people were led to believe that atheists are common.

Study 3 also tested an important alternative explanation. Although results from the first two studies were consistent with the notion that perceived atheist prevalence decreased anti-atheist prejudice, they cannot rule out the possibility that intergroup contact, rather than perceived atheist prevalence, was responsible for these effects. Intergroup contact can reduce prejudice against a whole host of outgroups (see Pettigrew, 1998, for a review, or Pettigrew & Tropp, 2006, for a meta-analysis). Neither of the first two studies measured intergroup contact, but intergroup contact is more likely where atheists are more common. In addition, people who think atheists are more common might have had more contact with atheists. By directly manipulating information about how common atheists are (rather than any sort of contact with atheists), Study 3 provided a more focused experimental framework for evaluating this alternative.

Furthermore, Study 3 was designed to test a more nuanced version of this alternative explanation. In addition to actual contact, indirect contact—such as knowledge that another ingroup member is also friends with an outgroup member—can reduce prejudice (Wright, Aron, McLaughlin-Volpe, & Ropp, 1997). Recent evidence extends this even further: Imagined contact makes people feel generally more positively toward various outgroups (e.g., Turner & Crisp, 2010; Turner, Crisp, & Lambert, 2007). It is possible that people who think that atheists are more common might believe or imagine that they have more frequently been in contact with atheists. Because previous research indicates that imagined contact can reduce prejudice, as measured by general positive and negative attitudes (e.g., Turner, Crisp, et al., 2007), information about atheist prevalence might prompt people to imagine contact with atheists, leading them to feel more positively about atheists. This latter account would make two specific predictions about the consequences of learning that atheists are common. If the present effects are solely attributable to contact effects, then learning about atheist prevalence should (a) lead people to generally feel more positively toward atheists and (b) increase perceptions of contact with atheists.

The present theoretical framework, on the other hand, makes contrasting predictions. If learning about atheist prevalence—*independent of perceived contact with atheists*—leads people to revise an appraisal that atheists are untrustworthy, then information about atheist prevalence should not influence general attitudes toward atheists or perceptions of contact with atheists. Instead, it should decrease distrust of atheists. These competing predictions were tested in Study 3, and I hypothesized that information that atheists are common would decrease ratings of atheist distrust but would not affect

more general attitudes toward atheists or perceived contact with atheists.

Method and Measures

For extra credit, 112 undergraduates (74% female, mean age = 19.7) participated.

Independent variable: Atheist numbers. Participants read one of two brief articles about the numbers of atheists worldwide as well as among undergraduates at their university. To determine atheist prevalence estimates for these articles, I conducted a pilot study ($N = 119$) in which participants provided a percentage estimate of atheist prevalence at their university. The modal estimate (25% of participants) was 5% atheists, and 40% of participants estimated that their university contains 5% or fewer atheists. In contrast, few participants (4%) estimated that their university had more than 30% atheists, and only one participant estimated that at least 50% of students were atheists. On average, participants felt that atheists were relatively rare ($M = 11.45\%$, $SD = 9.49\%$, 95% CI = 9.74% to 13.15%). With these data in mind, the two articles were designed to starkly contrast high atheist prevalence and low atheist prevalence. In the atheists common condition ($n = 57$), the article included the statistic that roughly 50% of students at their university are atheists as well as the aforementioned information about how common atheists actually are worldwide (fourth largest religious group in the world, etc.; from Zuckerman, 2007). In the atheists rare condition ($n = 55$), the article pointed out that in studies performed at their university, only about 5% of students are atheists and that atheists are rare around the world. Relative to the pilot data, atheist prevalence estimates provided in these articles were either surprisingly high or plausibly low, respectively.

Outcome measures. Outcome measures included a manipulation check, a measure of specific atheist distrust, a general measure of people's positive or negative attitudes toward atheists, and two measures of perceived contact with atheists.

As a manipulation check, participants rated their agreement (on a 7-point scale from $-3 =$ *strongly disagree* to $3 =$ *strongly agree*) with the statement "Atheists are very common."

To assess atheist distrust, participants rated their agreement (from $1 =$ *strongly disagree* to $7 =$ *strongly agree*) with two statements: "Atheists are dishonest" and "Atheists are trustworthy." The latter item was reverse scored, and then the two ($r = .38$, $p < .001$) were summed to form a single composite measure of atheist distrust.

General attitudes toward atheists were assessed using a standard "feeling thermometer."

I used two separate face-valid measures of perceived contact with atheists. First, participants provided an open-ended

estimate of how many atheists they know. Second, they rated their agreement (from $1 =$ *strongly disagree* to $7 =$ *strongly agree*) with two statements: "I often come into contact with atheists" and "I rarely, if ever come into contact with atheists." The latter item was reverse scored, and then the two ($r = .55$, $p < .001$) were summed to form a single composite measure of perceived contact with atheists.

Results and Discussion

Manipulation check. As expected, participants in the atheists common condition rated atheists as more common than did participants in the atheists rare condition, $t(110) = 6.02$, $p < .001$; common: $M = 5.09$, $SD = 1.52$; rare: $M = 3.31$, $SD = 1.61$. Information about high atheist prevalence increased the degree to which participants perceived atheists to be common.

Atheist distrust. The primary hypothesis in Study 3 was that information about high atheist prevalence would decrease distrust of atheists, relative to information about low atheist prevalence. As hypothesized, participants in the atheists common condition exhibited significantly less atheist distrust than did participants in the atheists rare condition, $t(109) = 2.16$, $p = .03$, Cohen's $d = .41$ (see Figure 1). Information that atheists are numerous reduced distrust of atheists.

General attitudes. Relative to participants in the atheists rare condition, participants in the atheists common condition did not rate atheists significantly higher on the "feeling thermometer," $t(110) = 0.95$, $p = .32$. Information about atheist prevalence did not significantly increase the degree to which participants felt generally positively toward atheists.

Perceived contact. Relative to participants in the atheists rare condition, participants in the atheists common condition did not indicate that they knew significantly more atheists, $t(110) = 1.43$, $p = .16$, nor did they indicate significantly more perceived contact with atheists, $t(108) = 1.32$, $p = .19$. Information about atheist prevalence did not significantly increase perceived contact with atheists. Consistent with previous research on intergroup contact, however, both of these measures were associated with more positive evaluations on the "feeling thermometer," both r s $> .25$, both p s $< .05$.

Summary

Information that atheists are actually quite common, both worldwide and in the immediate environment, reduced distrust of atheists. In contrast, this information did not lead people to view atheists in a generally more positive light, as would be predicted by an intergroup contact perspective. Furthermore, learning that atheists are common did not lead participants to perceive more contact with atheists. These results are consistent with the predictions of the present theoretical framework but are more difficult to reconcile with intergroup contact.

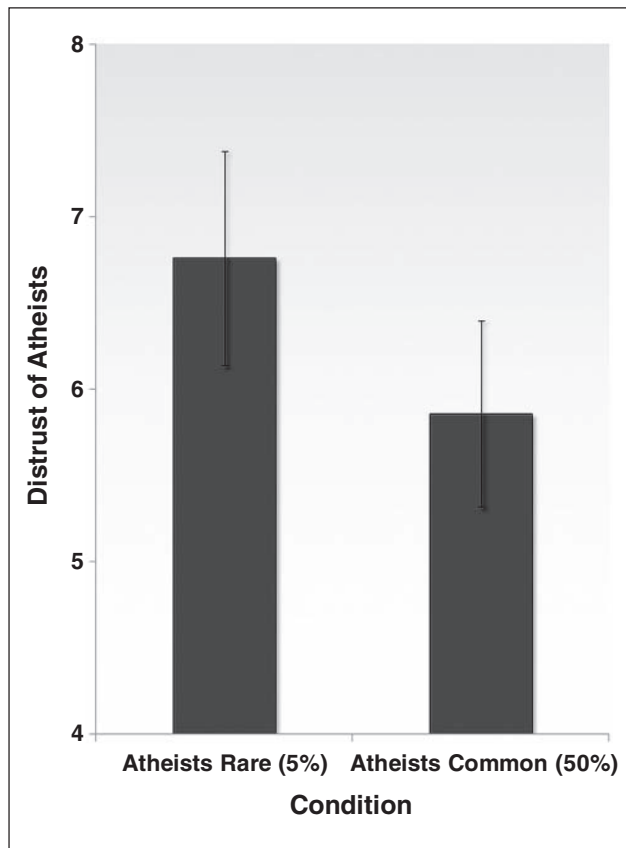


Figure 1. Information that atheists are numerous reduced explicit distrust of atheists

Note: Figure depicts explicit distrust of atheists after participants read an article stating that atheists are either relatively rare (atheists rare) or relatively common (atheists common), with 95% confidence intervals. Possible distrust of atheist values range from 2 to 14.

Study 4

Overview

Study 4 replicated and extended the findings of Study 3 in three primary ways. First, although Study 3 neatly contrasted a high atheist prevalence condition and a low atheist prevalence condition, it did not contain a condition in which participants received no information about atheist prevalence. Thus, in Study 4, participants were either in a condition in which atheist prevalence was clearly described or in a true control condition in which they performed a comparable task that did not mention atheist prevalence. Second, Study 3 included a high prevalence estimate of 50% atheists; Study 4 tested whether a more modest, though still higher than baseline, atheist prevalence estimate could reduce distrust of atheists. Finally, Study 3 tested only explicit distrust of atheists. Study 4 extended this by testing whether perceived atheist prevalence can also influence implicit distrust of atheists. Overt, explicitly expressed prejudice often diverges from more

subtle or implicit measures of prejudice (e.g., Devine, 1989; McConnell & Leibold, 2001; Wittenbrink, Judd, & Park, 1997). Although it is presently unknown whether or not there is as much stigma attached to overt expressions of anti-atheist prejudice as there is attached to overt racism or homophobia, evidence that implicit biases can be reduced by prevalence information would be beneficial, as the results of the first studies could indicate that people who think that atheists are more numerous are simply less willing to openly endorse anti-atheist prejudice.

Study 4 investigated whether the implied prevalence of atheists can reduce implicit atheist distrust using a version of the Implicit Association Task (IAT; Greenwald, McGhee, & Schwartz, 1998). Participants were in either a control condition containing no information about atheist prevalence or a condition in which they read a short passage outlining the growing numbers of atheists. Study 4 tested the hypothesis that information about atheist prevalence would reduce implicit atheist distrust.

Method and Measures

For extra credit, 80 undergraduates (70% female, mean age = 20.4) participated. All participants completed a practice IAT to familiarize themselves with the computer task, followed by one of two versions of a short reading and writing task (the independent variable), followed by a trust-specific IAT (the dependent variable).

Independent variable: Reading and writing. Participants in the control condition ($n = 40$) were asked to think of and write about their favorite food. Participants in the atheist prevalence condition ($n = 40$) read and provided a written summary of a passage detailing the demographic rise of atheists and nonreligious people, including an atheist prevalence estimate of around 20% (adapted from O'Brien, 2007).¹ The written portion of these tasks was included merely to ensure that participants paid attention to the material and to ensure that participants in both conditions engaged in similarly demanding tasks. As a manipulation check, an independent sample of students estimated the percentage of atheists at their university after performing either the control task ($n = 39$) or the atheist prevalence task ($n = 40$). As expected, atheist prevalence estimates significantly differed between these two conditions, $t(63.1) = 2.48, p = .02$; control: $M = 10.82\%$, $SD = 6.57\%$; atheist prevalence: $M = 15.95\%$, $SD = 11.26\%$.

Dependent variable: Implicit distrust. Because Study 3 indicated that information about atheist prevalence reduced distrust of atheists but did not affect more general attitudinal measures, the dependent variable in Study 4 was a trust-specific version of the IAT (rather than a traditional positive-negative valence IAT) and followed the methods presented by Park and Schaller (2005), only with a different semantic category. In this task, participants were familiarized with

two fictional women, Julie and Vanessa. Participants saw three pictures of each target. The targets were easily distinguishable, matched for attractiveness, and fully counterbalanced across subjects. For each participant, one of the targets was always described as “religious” and the other was always described as “an atheist (someone who does not believe in God).” Participants then completed a three-item religion questionnaire for both Julie and Vanessa, including questions about belief in God, prayer frequency, and frequency of church attendance. Next, participants wrote a brief religious debate between Julie and Vanessa. These responses were not analyzed further, as they were intended merely to familiarize participants with the two targets and highlight their respective (ir)religious identities.

Finally, participants completed the computer task. They were timed as they categorized pictures of both targets as well as words associated with either *trust* (truthful, credible, dependable, honest, upright, trustworthy) or *distrust* (sneaky, lying, devious, dishonest, deceitful, shady). In one set of trials, the atheist target was paired with *distrust* words whereas the religious target was paired with *trust* words. In another set of trials, these pairings were reversed. The relative speed with which participants categorize targets and words in these two sets of trials can be used to form inferences about the strength of association between the target group (atheist vs. religious) and the category of the words (distrust vs. trust; for a more extended discussion of these methods, please see Greenwald et al., 1998, and Greenwald, Nosek, & Banaji, 2003). This task therefore provided a measure of the degree to which atheists, relative to religious individuals, were associated with distrust. In pilot testing, this task was both reliable and valid.²

Results and Discussion

Study 4 tested the hypothesis that information about atheist prevalence would reduce implicit atheist distrust. As hypothesized, implicit distrust was lower in the atheist prevalence condition than in the control condition, $t(78) = 2.18, p = .03$, Cohen's $d = .49$ (see Figure 2). The distrust effect in the atheist prevalence condition was not significantly different from zero, one-sample $t(39) = 0.15, p = .88$, Cohen's $d = .05$. As hypothesized, reading about atheist prevalence reduced implicit atheist distrust.

General Discussion

Prejudice against outgroups generally increases if those outgroups have more members, but this pattern was reversed for anti-atheist prejudice. In four studies utilizing drastically different methods and employing a wide variety of control variables that tested possible alternative explanations, a coherent picture emerged. First, across 54 countries representing most of the world's population, anti-atheist prejudice among

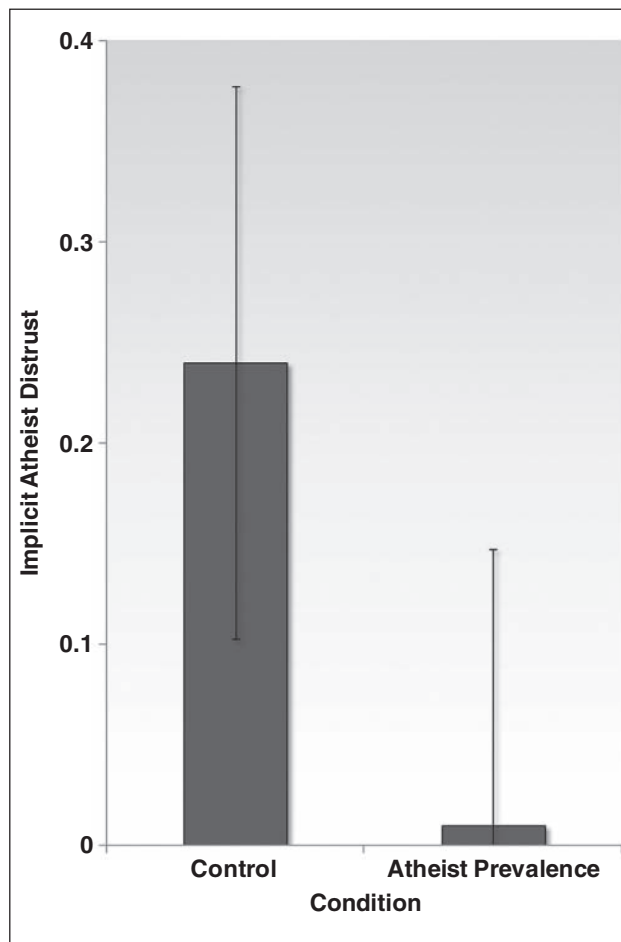


Figure 2. Information about atheist prevalence reduced implicit distrust of atheists

Note: Figure depicts implicit distrust of atheists after participants read and wrote about food (control) or the prevalence of atheists (atheist prevalence), with 95% confidence intervals. The y-axis represents the mean d -score obtained in the Implicit Association Task, which is analogous to a standard effect size with positive values reflecting associations between atheist and “distrust” and negative values reflecting associations between atheist and “trust,” relative to religious believers.

believers was reduced where atheists are common, even after controlling for numerous important individual and international differences (Study 1). Second, in a university sample, anti-atheist prejudice was reduced among participants who thought that atheists were more common (Study 2). Third, information about high atheist prevalence reduced explicit distrust of atheists but did not affect perceptions of contact with atheists or a general attitudinal measure of prejudice (Study 3). Finally, atheist prevalence information reduced implicit atheist distrust (Study 4). Perceived atheist prevalence reduced anti-atheist prejudice.

These studies make a number of important contributions. First, they are among the first to examine prejudice against atheists, an understudied yet rapidly growing population.

More importantly, however, these studies contribute to basic theory concerning the social psychological bases of prejudice. Because prejudice against various groups derives from the diverse threats that the groups are seen to pose (e.g., Cottrell & Neuberg, 2005), different prejudices might have differing relationships to a wide range of contextual factors, including relative outgroup size. To date, however, this possibility has not been directly tested, and the vast majority of research relating prejudice to outgroup size has focused only on interracial relations. The present results suggest that for at least some groups, perceptions of outgroup prevalence *decrease*, rather than increase, prejudice. Studies 3 and 4 present the first known evidence that mere prevalence information can reduce prejudice against any outgroup. Furthermore, these results indicate that a purely informational intervention—*notifying people that an outgroup is common*—can reduce prejudice in certain cases, potentially suggesting a novel route to prejudice reduction that is distinct from intergroup contact and imagined intergroup contact. Given this novelty, some speculation about alternative explanations and possible mechanisms is warranted.

Perceived Prevalence and Intergroup Contact

Is it possible that intergroup contact explains the present results? Consistent with this alternative, intergroup contact with atheists is probably more likely where atheists are common (Study 1), and people who think atheists more numerous might have more perceived contact with atheists (Study 2).

However, intergroup contact does not easily accommodate the findings of the final experiments, where information about how numerous atheists are significantly reduced explicit distrust of atheists (Study 3) and all but eliminated implicit atheist distrust (Study 4). Is it possible that information about atheist prevalence led to a sort of “retrospective contact” with atheists? That is, did prevalence information make people realize that they frequently come into contact with atheists? Study 3 did not find any evidence to support this supposition, as information about atheist prevalence did not make people report that they know more atheists, and it did not increase perceived contact with atheists.

Might prevalence information lead to imagined contact with atheists? Although it is conceivable that reminders of atheist prevalence led to some degree of imagined contact, it is far from clear that this manipulation would lead to the sort of simulated, positive imagined contact that has been demonstrated effective at reducing prejudice (e.g., Turner, Crisp, et al., 2007). Nonetheless, it is possible that the information prompted people to imagine particular instances of contact with atheists. The present data are insufficient to confirm or refute this possibility, but it is worth noting that a key prediction made by an imagined contact account—that reminders of prevalence should affect general feelings of positivity rather than specific appraisals of distrust—enjoyed no empirical

support. Nonetheless, contact-like effects are a possibility. At the very least the present effects appear analogous to contact effects, and more research on the distinction—and possible relationship—between perceived prevalence and intergroup contact is needed.

Complementary Processes and Possible Mechanisms

A sociofunctional consideration of distrust as the basis of anti-atheist prejudice, combined with the individual and collective inconspicuousness of atheists, led to the hypotheses that anti-atheist prejudice would be negatively associated with atheist prevalence and that information about atheist prevalence would reduce distrust of atheists. Although these hypotheses were supported, the present studies did not precisely identify the more proximal psychological processes responsible for these results. Nonetheless, I speculatively identify one process that complements the proposed framework as well as two mechanisms that might mediate the observed effects.

First, perceived social consensus effects may have influenced the present findings. Perceptions of consensus attitudes can profoundly affect attitudes toward outgroups. Learning that others share one’s stereotypes both increases the subsequent accessibility of those and related stereotypes and affects prejudicial behavior (Sechrist & Stangor, 2001). In terms of reducing conflict, learning about a positive consensus view of an outgroup can lead to decreased negative stereotyping (Puhl, Schwartz, & Brownell, 2005) and more favorable attitudes (Stangor, Sechrist, & Jost, 2001), even among prejudiced individuals (Wittenbrink & Henly, 1996).

One (admittedly speculative) possibility is that changes in the relative size of an outgroup affect attitudes toward that outgroup because these demographic shifts change the complexion of any perceived social consensus. Negative attitudes and stereotypes about relatively small outgroups would be bolstered by these social consensus effects. As the outgroup grows (or is perceived to grow), the consensus would erode. A growing outgroup also brings the realization that a significant number of people (the outgroup members) view the outgroup favorably. Furthermore, there is evidence that social consensus effects are more pronounced for unfamiliar outgroups, compared to familiar outgroups (Sechrist & Stangor, 2007). Given the general inconspicuousness of atheists, social consensus effects might have played a role in the present results. In sum, an increase in relative outgroup size might have altered perceptions of consensus attitudes, leading to reduced prejudice. Future research should explore whether information about the relative size of a group such as atheists has this proposed effect on perceived consensus attitudes.

Second, intergroup anxiety may mediate the relationship between perceived atheist prevalence and anti-atheist

prejudice. Although the present perceived prevalence effects appeared distinct from intergroup contact effects, the two are conceptually similar and may be mediated by similar processes. Intergroup contact more powerfully influences affective aspects of prejudice than cognitive aspects of prejudice (Tropp & Pettigrew, 2005). This is plausibly the case for perceived prevalence effects as well, and because reductions in intergroup anxiety often enable prejudice reduction (e.g., Stephan & Stephan, 1985; Turner, Hewstone, & Voci, 2007; Turner, Hewstone, Voci, & Vonofakou, 2008), information about how numerous atheists are may affect prejudice by decreasing anxiety.

Finally, both of the contact-based accounts already considered rely on the assumption that prevalence information triggers some sort of perceived contact, in the form of either realized past contact or imagined present contact. It is possible that prevalence information instead makes people anticipate *future* contact with atheists. After all, if atheists are common, they are more likely to be encountered. Classic research in social psychology demonstrates that anticipated future contact promotes liking of strangers (e.g., Darley & Berscheid, 1967). Perhaps anticipated contact with atheists promotes trust. This, however, is tentative, and much more research is needed both to flesh out the processes by which perceptions of atheist prevalence influence anti-atheist prejudice and to determine why relative group size is positively related to some prejudices and negatively related to others. Although a more thorough understanding of the processes involved is necessary, the present results suggest an exciting application for the reduction of certain prejudices.

Reducing Prejudice by Publicizing Numbers

At least for atheists, information about outgroup prevalence can reduce prejudice. This novel approach to prejudice reduction suggests that contact-like effects may be attainable through interventions that do not rely on actual (or for that matter imagined) contact. These interventions could reduce prejudice by merely making information available about the prevalence of various outgroups. Such interventions would be much easier to implement than would interventions requiring interaction between members of different groups.

In addition, such interventions could be especially useful for alleviating prejudice against groups defined by concealable stigma. Intergroup contact can reduce prejudice based on concealable stigma—indeed, there is evidence that contact effects may be particularly effective for addressing prejudice against homosexuals (Pettigrew & Tropp, 2006)—but it requires individuals to disclose their concealed stigmas to others. At the very least, contact is most effective when a concealed stigma is directly disclosed by an individual, rather than learned secondhand or inferred (Herek & Capitano, 1996). However, individuals living with concealed

stigmas face considerable stress over the management and possible disclosure of their stigma (e.g., Pachankis, 2007; Ragins, Singh, & Cornwall, 2007), and a prejudice intervention that requires disclosure of a concealed stigma is perhaps less than ideal. Instead, the present results indicate that merely providing information about *collective* prevalence could reduce prejudice, obviating the need for *individual* disclosure.

Although such interventions may prove useful, it is unclear which exact features of different outgroups would make them most amenable to interventions that rely on prevalence information. Previous research relating anti-Black prejudice to relative outgroup size would suggest that beneficial effects of perceived outgroup prevalence should be expected only for groups that are neither feared nor viewed as threats to physical safety. Instead, the present results indicate that such interventions would be useful for addressing other prejudices based on distrust. It remains an open question how perceived outgroup prevalence would relate to prejudices based on other appraisals, such as prejudice against groups that are viewed with disgust or pity (such as gay men and Native Americans, respectively; Cottrell & Neuberg, 2005).

In addition, the results suggest that perceived prevalence effects might be especially effective for reducing prejudice associated with concealable stigma. It is hard to tell how numerous a group is if its members are not readily identifiable: Concealable stigma complicates inferences about outgroup prevalence. This ambiguity might be instrumental, making prevalence information about groups defined by concealable stigma especially impactful. If true, then information about outgroup prevalence might be useful in combating a variety of other “inconspicuous” prejudices, including interdenominational religious prejudice, prejudice against people with differing political beliefs, and sexual prejudice (prejudice based on sexual preference; Herek, 2000).

This latter case is particularly intriguing, as there may be strong parallels between attitudes toward atheists and attitudes toward homosexuals. Like anti-atheist prejudice, sexual prejudice is consistently associated with religion (e.g., Herek, 1987; Rowatt et al., 2006). Like atheism, homosexuality is concealable, and people may similarly be uncertain of how numerous atheists and homosexuals actually are. This similarity is strongly emphasized by Dawkins (2006), who argues that anti-atheist prejudice might be overcome if atheists can find a way to “come out” and raise public awareness of atheism like the Gay Pride movement mobilized widespread support for the acceptance of homosexuality. These movements make plain how numerous atheists and homosexuals actually are. Nonetheless, it is possible that these superficial similarities obscure more fundamental differences. For instance, anti-atheist prejudice is characterized by distrust, whereas disgust is more prominent in

sexual prejudice (e.g., Cottrell & Neuberg, 2005; Inbar, Pizarro, Knobe, & Bloom, 2009). It is possible that reminders of outgroup prevalence are more effective at reducing distrust than they are at reducing a more visceral reaction such as disgust. The full implications of these differences are unknown, and the strength of the analogy between attitudes toward both atheists and homosexuals awaits scientific scrutiny.

Only a dedicated research effort can determine whether the effects reported in this article are specific to attitudes toward atheists or are indicative of a pattern that could generalize to other groups. The present research provides some suggestions about which kinds of groups might be most appropriate for such investigations. Future research should explore which features of outgroups moderate the relationship between outgroup prevalence and prejudice, particularly focusing on the perceived threats posed by different groups as well as the degree to which the prejudice is based on concealable attributes.

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Notes

1. A one-sample *t* test revealed that this 20% figure is significantly higher than the baseline estimate mentioned in Study 3, $t(118) = 9.82, p < .001$.
2. A pilot test ($N = 36$) assessed the reliability and validity of the Trust Implicit Association Task (IAT). Based on reaction times to the 40 trials that make up each critical block of the IAT, I performed two separate split half calculations (trial-by-trial split-half patterns were abababab . . . , and ceddcdd . . . , respectively), yielding four separate Trust IAT *d*-scores for each participant (based on a, b, c, and d trial groupings). Based on these scores, the Trust IAT was internally consistent ($\alpha = .87$). This measure also exhibited divergent validity from a standard positive-negative valence IAT: In a regression model with both the Trust IAT and a conventional Positive-Negative IAT predicting scores on the Negative Attitudes Towards Atheists (NATA) scale used in Study 2, only the Trust IAT uniquely predicted NATA scores, Trust: $\beta = .39, p = .03$; Positive-Negative: $\beta = .10, p = .56$.

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