

The Moderating Effect of Psychological Essentialism on the Relationship Between Intergroup
Contact with Atheists and Outgroup Attitudes

by

Brock C. Rozich

Presented to the Faculty of the Graduate School of
The University of Texas at Arlington in Partial Fulfillment
of the Requirements
for the Degree of

DOCTOR OF PHILOSOPHY

THE UNIVERSITY OF TEXAS AT ARLINGTON

AUGUST 2021

Copyright © by Brock Rozich 2021

All Rights Reserved



Acknowledgements

First, I would like to thank my mentor, Dr. Jared Kenworthy. I am forever grateful for him taking me on as a student, as well as for his guidance and support throughout my time at the University of Texas at Arlington. I truly could not have had a better experience working with him. Additionally, I want to thank my other committee members, Dr. Paul Paulus, Dr. Dan Levine, Dr. Angela Dougall, and Dr. Lauren Coursey- each of these individuals have had a profound impact on me, and I truly would not have made it through without their guidance. From the University of Northern Iowa, Dr. Helen Harton, Dr. Carolyn Hildebrandt, and Dr. Kim MacLin all helped me improve as a researcher during my time there, as did Dr. William DeLamarter and Dr. Aimee Knupsky at Allegheny College. I am truly grateful to be given the opportunity to work with such talented researchers and instructors. Additionally, I want to thank Dr. Michelle vanDellen from the University of Georgia for providing me the opportunity to expand my research experience and to prepare for graduate school. There are countless graduate students at UTA who came before me and provided their support, but I specifically would like to thank Belinda Williams, Ryan Gertner, and Jubilee Dickson for helping me acclimate at both a personal and professional level when I first moved to Texas. My friends and family have also been incredibly supportive throughout my graduate career- thank you specifically to mom, dad, Kaitlyn, and Grant for helping me make it to where I am today, as well as to Conner for supporting me during this project. Finally, I want to thank my dog Jackson- no matter where we ended up, you were a constant source of companionship and unconditional love. You carried me through the rough patches and were always happy just to be with me, even when the dog park had to wait because of work.

Table of Contents

Acknowledgments.....	iii
Abstract.....	2
Introduction.....	3
Hypotheses.....	13
Study One.....	14
Method.....	14
Participants.....	14
Measures and Materials.....	16
Procedure.....	19
Results and Discussion.....	19
Study Two.....	31
Method.....	31
Participants.....	32
Measures and Materials.....	32
Procedure.....	32
Results and Discussion.....	33
Exploratory Analyses	37
General Discussion.....	40
Limitations and Future Direction.....	40
References.....	42
Tables.....	48
Appendices.....	53

The Moderating Effect of Psychological Essentialism on the Relationship Between Intergroup
Contact with Atheists and Outgroup Attitudes

Brock C. Rozich

Department of Psychology

University of Texas at Arlington

August, 2021

Supervising Professor: Jared Kenworthy

Abstract

The present studies examine the effect of psychological essentialism on the relationship between contact and attitudes with regard to religious outgroup members, specifically atheists. Although previous research has been conducted that examines the relationship between outgroup contact on prejudice reduction (Pettigrew & Tropp, 2000), the approach of the current studies examining the potential moderating effect of psychological essentialism offers a novel contribution to the field. While prejudice research is widely conducted today, studies that focus on religious prejudice and the issues that religious minorities face is comparatively sparse (Gervais, 2011). By using existing literature, I hypothesized that essentialism will moderate the relationship between contact with atheists and the attitudes that individuals hold toward members of the atheist outgroup. Though essentialism served as an effective moderator in some models, the results were not consistent. Additionally, essentialism was not able to be effectively manipulated using our approach, so any causal relationships were difficult to address. Further research is warranted at this time to determine a) the effectiveness of essentialism in moderating the relationship between contact and attitudes, and b) the ability to examine the causal effects of essentialism as both a moderator and predictor of outgroup attitudes.

Keywords: atheist, prejudice, outgroup, religion, intergroup contact, contact theory

The Moderating Effect of Psychological Essentialism on the Relationship Between Intergroup Contact with Atheists and Outgroup Attitudes

Intergroup conflict is one of the leading social issues in contemporary American culture, including issues of social and institutional prejudice and discrimination for racial, ethnic, and sexual minorities. Today, we see calls for action against these types of attitudes and behavior in the form of political commentary, social activist groups, and news media across the country. One instance of minorities facing prejudice and discrimination, however, is often left out of these discussions- religious groups, and in particular- atheists. Atheists are one of the least favorably viewed outgroups in the United States, often being viewed as untrustworthy, immoral, and unfit for position of leadership (Gervais, 2011; 2014; Rozich, 2016). While previous research has demonstrated that intergroup contact can reduce prejudice towards outgroups (Pettigrew & Tropp, 2000), this concept has not been explored in depth in regard to religious intergroup contact, nor has contact theory (Allport, 1954) been widely applied toward atheist outgroups. To answer these questions, the present study examines both the quality and quantity of intergroup contact of religious individuals and what effect, if any, these variables have on attitudes toward atheists. Additionally, psychological essentialism, or the idea that certain factors of individuality are inherited and unobservable (Gelman, 2003), will also be assessed as a potential moderator between contact and attitudes.

Ingroup Bias

The tendency for individuals to divide into groups has been longstanding. Within this divide, we also tend to see a preference for members of the group to which an individual belongs. In a 1979 review by Brewer, a variety of different intergroup judgment tasks were

analyzed and displayed a consistent pattern of preference for ingroup members. These behaviors and attitudes that lead to preference of ingroup members is known as the *ingroup bias*.

Tajfel (1970) demonstrated a similar construct in that the simple act of separating individuals into arbitrary groups led to an increase in negative attitudes towards outgroup members, as well as a rise in conflict between the two groups. This phenomenon, described as the *minimal-groups effect*, emerged even when the most minute differences between groups were salient to group members (e.g., whether group members thought a projected image was blue or green, the number of dots group members estimated in a grid, etc.). These results suggest that the mere act of individuals belonging to different groups can lead to negative attitudes and hostility toward outgroup members, even in the absence of a threat to the value structure or worldview of a particular ingroup.

Both the minimal-groups paradigm and ingroup bias lend heavily to research between ingroup and outgroup members, as well as related constructs such as prejudice, which generally consists of negative attitudes toward certain groups. While these constructs are important to the field of intergroup research, the present study will focus on the broader construct of intergroup contact and its relationship with outgroup attitudes.

Contact Theory

The study of the contact between groups is well-documented beginning at least with Allport's (1954) chapter focusing on intergroup contact. Allport posited that as contact increases, attitudes toward outgroup members will become more positive as well. The relationship between increased contact and more positive attitudes has been studied across a wide range of social groups and has demonstrated a robust effect. In a 2006 meta-analysis, Pettigrew and Tropp found

that this effect was consistent toward various racial, sexual, and ethnic outgroups. Religious groups, however, were not considered in the analysis.

Few studies have examined the relationship between contact between religious groups and outgroup attitudes. In a study by Kanas et al. (2015), researchers found that majority group Muslims reported a decrease in outgroup prejudice toward minority Christians when there were high levels of contact quantity, though this effect was not true of the reverse (Christians did not report decreased levels of outgroup prejudice as contact quantity increased). Consistent with previous contact research, the *quality* of the contact served as a stronger predictor of decreased prejudice, and also resulted in the effect being present for both Christians and Muslims (better contact quality regardless of group membership).

Similarly, Hewstone and colleagues (2011) examined the effect of contact on attitudes toward Muslim outgroup members in the United Kingdom. Though contact was viewed as a single construct in this study (viz., contact quality and contact quantity were combined), previous findings were replicated with lower levels of prejudice being reported by those who had higher levels of intergroup contact. This was also evident in research by Islam and Hewstone (1993) analyzing the relationship between Hindu minority and Muslim majority members in Bangladesh. In this study, contact was predictive of outgroup attitudes, intergroup anxiety, and perceived outgroup variability.

Research examining the effect of contact on prejudice reduction toward atheists specifically is currently non-existent, at least in the published literature. Though there are related constructs that have been used to predict atheist prejudice, such as perceived prevalence of atheists (Gervais, 2011), the effect of contact is still a novel exploration. Using the existing (albeit sparse) literature focusing on contact with religious outgroups, we can posit that contact

will be negatively associated with prejudice toward atheist outgroup members given that, like Muslims, they are a maligned social category (Gervais et al., 2011).

While literature exists that seeks to explore why prejudice exists towards atheists, little research explores what factors may lead to a minimization or elimination of these prejudices. Literature by Pettigrew and Tropp (2000) demonstrated that an increase in contact with outgroup members was associated with a reduction to prejudice towards that outgroup. What the study did not explore in depth, however, was what effect, if any, contact between religious groups had on attitudes towards outgroup members. That is, would increasing contact with outgroup members serve to increase attitudes towards members of those respective religious outgroups? Given the state of the literature on intergroup contact, it is likely that the relationship between contact and attitudes toward religious outgroups parallels that for other types of groups (e.g., ethnic, gender, nationality). However, it is possible that, because of the often strong ideological and value differences that exist between religious groups, the relationship between contact and attitudes may be weaker in this context.

Atheist Attitudes

Outgroups are more at risk for being victimized by discrimination and prejudice if they are seen as a value-violating group, or one that does not adhere to traditional norms of the society. Crandall et al. (2002) conducted research that focused on identifying when hostility and negative attitudes toward outgroups and outgroup members would be viewed as acceptable. They also wanted to determine how closely aligned individual attitudes were with group norms. Individuals' ratings of acceptability of prejudice towards outgroups correlated strongly with ratings conducted by the group in a collaborative setting. Additionally, these ratings of acceptability of prejudice predicted support of active acts of discrimination towards these

respective outgroups. For instance, outgroups that typically violate social norms, such as criminals, were rated as being acceptable to have prejudice against, as well as to actively discriminate against. Non-value violating outgroups, such as the handicapped, were not deemed appropriate to harbor prejudice towards, or to actively discriminate against.

Although discriminating against certain groups is broadly viewed as socially unacceptable (e.g., ethnic minorities, members of the LGBT community, etc.), the acceptability of harboring negative attitudes towards other outgroups is more unclear. For example, if a previously convicted sex-offender moves into an apartment complex, individuals in that complex may try to have the offender evicted as they do not want them in their neighborhood. In a 2007 study, Zitek and Hebl demonstrated that the more ambiguous a group's status was as an acceptable target of discrimination, individuals would report higher levels of prejudice and discrimination towards that outgroup. Additionally, it was found that the more unclear the acceptability of having negative attitudes and exhibiting prejudicial behavior towards the outgroup, the greater the likelihood of having both short-term and long-term attitude changes as a result of peer influence. Because atheists traditionally fall under the category of value-violating outgroups (Gervais, 2011), these studies partially explain the willingness and acceptance of individuals to carry negative attitudes towards them, as well as to actively discriminate.

Gallup (2015) has conducted polls over the course of several decades centering on voting patterns for hypothetical candidates in the United States' presidential elections. Since the study's inception, individuals have consistently stated that they would be least likely to vote for an individual based solely on the information that they were an atheist, compared to other group classifications. In the most recent poll in 2015, hypothetical candidates who were described as Black, female, Hispanic, Jewish, or Catholic all saw a support rate in excess of 90% based on the

respective group identity being the only information available. Mormons saw an 81% support rate, whereas 74% of participants surveyed said they would support a candidate if they were gay or lesbian. Only slightly more than half of individuals would support a candidate who identified as Muslim (60%), or as an atheist (58%).

While atheists and Muslims were the only religious outgroups that seemed to drastically suffer in terms of hypothetical support for a potential presidential candidate, the lack of support for a potential Muslim president can at least be partially explained by the anti-Islamic sentiment which is present in the United States amid concerns regarding terrorism. Indeed, we can see an example of this in the 2008 presidential election, when a number of individuals attempted to impede the democratic nominee Barack Obama's path to the presidency by insinuating a linkage or outright claiming Obama's membership to the Islamic religion (Hollander, 2010). In regard to atheism, however, there is no single threat, such as terrorism, that explains the hostility and prejudice that is directed to the group. One of the overarching themes in atheist prejudice research, however, is the fact that individuals tend to see atheists as untrustworthy.

Gervais et al. (2011) sought to determine the root causes of anti-atheist sentiment in the United States. Atheists were compared to several other value-violating outgroups, including homosexual males, religious minorities, feminists, and criminals. Researchers focused on whether negative attitudes stemmed from distrust or disgust reactions. Whereas homosexual males elicited a disgust reaction from participants, which accounted for their overall negative attitudes, attitudes towards atheists were linked to levels of distrust.

Additionally, researchers examined the attribution of distrust using the conjunction fallacy measure. Conjunction fallacies occur when an individual assigns a label to an actor based on a limited amount of information. For example, if a man picks up a wallet on the street and

returns it to its rightful owner, is it more likely that that man is a) a businessman or b) a businessman and a Christian? Even though the first condition is more likely given that there is only one qualifier as opposed to two, individuals may habitually associate the actions of another individual with a specific group membership. If the participant applies a label based on the group membership provided (in this case, a Christian), a conjunction fallacy has occurred. Gervais and colleagues (2011) presented several labelling options (Christians, atheists, Muslims, and rapists) to account for religious ingroup, a religious outgroup, and a value violating outgroup.

Participants were then presented with several scenarios where moral transgressions occurred. Conjunction fallacies occurred more frequently when the opportunity to label the individual as an atheist was present, compared to the religious ingroup (Christian), a comparative religious outgroup (Muslims), and a value violating outgroup (rapists). These findings indicate atheists are distrusted more, even when accounting for their status as a religious outgroup.

Similar to distrust, atheists are also seen as a threatening force to an individual's way of life. The idea that an outgroup is attempting to impose their own values or way of life is known as *symbolic threat*. In a 2021 study by Rios and colleagues, researchers found that individuals would be less likely to accommodate workplace related requests from someone who was openly atheist (as opposed to Christian, Jewish, or Muslim) because of the perceived threat to their way of life.

Essentialism

Psychological essentialism focuses on the inherent qualities that lead a group to exist and distinguish themselves from other groups. The construct of essentialism was narrowed by Haslam and colleagues (2000), who argued the definition was too broad and all-encompassing.

The tenets of essentialism used for a factor analysis were discreteness, uniformity, informativeness, naturalness, immutability, stability, inherence, necessity, and exclusivity.

Though there is a wide variety of literature focusing on topics related to essentialism, such as entitativity and group cohesiveness, it is important to note the distinction that essentialism offers above and beyond these constructs. Entitativity refers to the idea that a group has little variation within its membership, or in other words, that the group is perceived as a collective whole as opposed to the sum of its parts. While there is an abundance of research that ties increased perceived entitativity of both the ingroup (Effron & Knowles, 2015) and outgroup (Agadullina & Lovakov, 2018) to increased outgroup prejudice, and while entitativity does fall under the umbrella of essentialism, this research does not address several core components of essentialism itself, such as the distinctiveness of the group, agency of group membership, or the belief of a natural driving force behind the group's existence. Similarly, while group cohesiveness measures strength of intragroup connections, it does not take into account the belief of underlying factors that are responsible for the group. Though topics related to essentialism have been explored in the realm of prejudice, essentialism still offers a novel contribution to the field of research.

Focusing on essentialism in regard to group research, groups that tend to be essentialized are seen as having an underlying fixed factor that makes them distinct from other social groups, predictive of member behavior, and are oftentimes seen as being rigid in terms of group members' ability to deviate from group norms (Simpson et al., 2017). For example, the gender of an individual may be viewed in a more determinative, essentialist manner than the age of an individual.

Previous research has demonstrated that different groups are essentialized in different manners. For instance, Demoulin and colleagues found that the individuals with high degrees of agency regarding group membership were rated differently than those with low degrees of agency. Looking at essentialism through a religious lens, Toosi and Ambady (2011) sought to determine if religious categorizations were viewed differently in regard to essentialism. Comparing more traditional religious identities (e.g., Christian, Muslim, Jewish) to more non-traditional identities, specifically atheist and 'spiritual' individuals, researchers found that identity did affect judgments of essentialism. Immutability and related traits (referred to in the article as natural kind-ness) had higher attribution for non-traditional religious identities, including atheists, than more traditional religious identities, indicating that non-traditional religious identities are seen as more rigid and less susceptible to change than more traditional religious identities.

Simpson and colleagues (2017) examined the independent effects of subsets of essentialism on prejudice toward atheists. Originally, the researchers used three subsets of essentialism as proposed by Haslam and Levy (2006). These subsets included: discreteness, which assesses how distinct a group is viewed compared to other social groups (e.g., atheists being viewed as their own social category as opposed to part of a religiosity continuum); naturalism, which explores the degree to which an individual views a group as culturally and historically universal (e.g., gender); and immutability, which measures the degree to which someone views an individual's group membership as unchangeable.

Upon conducting a principal components analysis following data collection, however, Simpson et al. (2017) further disseminated the immutability subset to three additional subsets: changeability, early-life fixedness, and heritability. Both of the original subsets of essentialism,

discreteness and naturalism, were significantly associated with levels of atheist prejudice, as was the novel changeability subset. Early-life fixedness and heritability did not tend to be predictive of atheist prejudice, however, though early-life fixedness was associated with perceived threat of atheists.

It is with Simpson and colleagues' (2017) measures of essentialism that I examined a potential moderating relationship between contact and attitudes toward atheists. The novelty that the present study introduces to the literature is twofold: first, comparative to other contact research, religious-oriented contact and subsequent attitudes is sparse. In perhaps the most oft-cited article in the contact literature (outside of Allport's original 1954 publication), a meta-analysis by Pettigrew and Tropp (2006) did not take contact with religious groups into account under their own category when compiling their data (instead grouping them into the 'other' category), at least in part due to the relative scarcity of available studies. This issue is further amplified when viewing the effects of contact while focusing on atheists as a specific target group. Second, while essentialism has been previously demonstrated to predict negative attitudes toward atheists (Simpson et al., 2017), it has not been used to explain a moderating effect of contact theory with religious targeted groups and has been sparsely researched in other maligned outgroups (Lytle et al., 2017).

Religiosity

Religious ideology has been widely researched as a potential predictor of prejudice. Previous research has identified that individuals who are high in religiosity tend to exhibit more prejudice overall toward outgroups (Allport & Ross, 1967; Hall et al., 2010; Hunsberger & Jackson, 2005). One of these predictors of outgroup prejudice is religious fundamentalism (Altemeyer & Hunsberger, 1992), which measures the belief of an individual that their religion

teaches an absolute truth and there can be no room for acceptance of other beliefs. Indeed, scoring highly on religious fundamentalism has been associated with negative attitudes toward not only religious outgroups (Johnson et al., 2012), but sexual and racial outgroups as well (Laythe et al., 2002).

On the other hand, factors such as quest religiosity (Batson & Schoenrade, 1991), which measures an individual's willingness to be open to alternative religious ideas and self-questioning, tend to be associated with more positive attitudes toward outgroup members when participants score highly (Altemeyer & Hunsberger, 1992). Though quest religiosity and religious fundamentalism are often strongly negatively correlated (Altemeyer & Hunsberger, 1992; Rozich, 2016), it is important to note that both scales measure independent constructs. Thus, both of these scales were analyzed as potential moderators and covariates in the present work.

Overview and Hypotheses

Hypothesis one posits that across studies, an increase in outgroup contact with atheists was associated with more positive attitudes toward atheist outgroup members. This is based on previous research that has demonstrated the versatility of the negative relationship between intergroup contact and outgroup prejudice across a wide variety of targeted outgroups (Pettigrew & Tropp, 2000; 2006).

Hypothesis two focuses on the moderating effect of psychological essentialism on the relationship between contact and attitudes. For study one, using a Johnson-Neyman plot analysis, I expected that individuals who have high levels (defined as using 1 standard deviation above the mean) of psychological essentialism toward atheists will have similar levels of outgroup attitudes regardless of the amount or quality of contact. Counter to this, however, I expected those with

low levels (defined as 1 standard deviation below the mean) of essentialism toward atheists to exhibit more positive outgroup attitudes as a result of increased and more positive contact. In other words, the slope of contact predicting attitudes should be more strongly positive for those with low essentialism, compared to those with high essentialism. For study two, a simple effects analysis was used, such that individuals assigned to the high essentialism condition were again expected to exhibit a weaker effect of contact on outgroup attitudes compared to those in the low essentialism.

Hypothesis three states that essentialism will moderate the relationship between contact and prejudice above and beyond the effects of religious fundamentalism and quest religiosity across studies. In study one, this was tested using a hierarchical regression model that controls for both quest religiosity and religious fundamentalism. In the second study, this was tested using a hierarchical regression to examine differences between manipulated high and low levels of essentialism, controlling for the religiosity variables.

Study One

Method

Participants

In Study One, 453 total participants were recruited from two samples. For participants in the first sample to be eligible for the study, participants must have been 18 years of age or older, currently enrolled as a student at the University of Texas at Arlington, and have completed a prescreening measure that included information such as age, gender, and religion. Within this prescreen, participants must have identified as Christian. In the SONA sample, 203 participants were recruited from the student pool. Data screening was conducted and 14 participants (6.7%) were excluded due to failing more than one attention check or were excluded for failing to

identify as Christian as they had selected during the pre-screening measure. The net sample size was 189 participants (predominantly Hispanic/Latinx (38.6%), female (78.8%), Catholic (56.0%) and Democratic (60.8%) with a mean age of 19.34 years ($SD = 4.08$); see Table 1 for complete demographics).

For the Amazon Mechanical Turk (mTurk, hereafter) sample, 250 participants were recruited from the general population by using the online software. Likewise, participants must have been a United States citizen, 18 years of age or older, and identify as a Christian to be eligible for the study. Individuals were screened for their religion using an initial questionnaire that asked a variety of demographic questions (political party, salary, etc.), to mask the purpose of the study. After conducting data screening, 12 participants (4.8%) were excluded due to failing more than one attention check or from identifying as a religion other than Christian, leaving a net sample size of 238 (predominantly Caucasian (62.2%), male (61.8%), Democratic (57.4%), and Catholic (76.1%) with a mean age of 37.14 years ($SD = 10.95$); see Table 2 for complete demographics).

For their participation in the study, participants from the SONA pool received research credit hours at a ratio of one credit for each hour the study takes (30 minutes, .5 research credits). For the general population (mTurk) sample, participants were compensated \$1.00 for their participation. If at any time throughout the process participants wished to withdraw from the study, they were free to do so without penalty and were permitted to receive partial credit, though no such participants elected to withdraw.

Measures and Materials

Participants completed several self-report questionnaires in addition to demographic information throughout the course of the study. These questionnaires focused on religious

attitudes, essentialism, ingroup identification, previous contact with both religious ingroups and outgroups, as well as other individual difference measures.

Batson and Schoenrade's (1991) Quest Religiosity scale was administered to analyze an individual's likelihood of having a more open view towards religion (e.g., questioning one's own faith, being open to the legitimacy of other religions, etc.). Participants rated their agreement using a 9-point Likert scale from 1 (strongly disagree) to 9 (strongly agree) for 12 items. These items were designed to analyze three factors of Quest Religiosity: readiness to face existential questions without reducing their complexity (e.g. "God is very important for me until I began to ask questions about the meaning of my own life"), self-criticism and perception of religious doubt as positive (e.g. questions are far more central to my religious experience than are answers), and openness to change (e.g. "I am constantly questioning my religious beliefs"). For the purposes of the present study, however, a composite of the entirety of the scale was used by creating an average of individual items after appropriate reverse-scoring. The scale demonstrates relatively strong reliability, with an internal consistency ranging from $\alpha = .75-.81$ in the researcher's samples, as well as correlating strongly ($r = .85-.90$ among samples) with the original 6-item measure of Quest Religiosity (Batson, 1976).

The Revised 12-Item Religious Fundamentalism Scale (Altemeyer & Hunsberger, 2004) was used to assess individual differences in religious fundamentalism. The scale is a modification of Altemeyer and Hunsberger's (1992) original religious fundamentalism scale, using a 9-point Likert scale from 1 (strongly disagree) to 7 (strongly agree) for a series of statements. Examples of these items would include "the basic cause of evil in this world is Satan, who is still constantly and ferociously fighting God", and "different religions and philosophies

have different versions of the truth, and may be equally right in their own way” (reverse-scored). The scale is administered using a mean value of the individual items after appropriate reverse-scoring. The reliability of the scale is strong, with an observed Cronbach’s alpha value of $\alpha = .91$.

Additionally, measures of religious identity and orientation (Allport & Ross, 1967) were collected. The scale measures the intrinsic and extrinsic nature of an individual’s religious beliefs using a mean value of Likert-type questions, with items concerning external factors, such as “though I believe in my religion, I feel there are many more important things in my life” representing extrinsic religiosity, and items focusing on internal factors, such as “my religious beliefs are what really lie behind my whole approach to life” representing intrinsic factors.

Contact with atheists was measured using two factors, both of which were adapted from Islam and Hewstone (1993) to focus on atheists as the targeted outgroup. First, contact quantity was measured to assess the amount of contact with outgroup members (e.g., “thinking of social contacts -- whether at home, or at work, or somewhere else -- how much contact do you have with atheists?”). Additionally, contact quality will measure the degree to which outgroup contact is positive or negative (e.g., “when you meet atheists, in general do you find the contact pleasant?”). To help avoid demand characteristics, a contact measure toward elderly people was also administered to participants.

Next, to measure the moderator variable of essentialism toward atheists, I used the scale developed by Simpson et al. (2017). This scale measures the three main components of essentialism (discreteness, naturalness, and immutability), while also breaking down the immutability construct into three additional subsets (changeability, early-life fixedness, and

heritability). The scale utilizes a Likert-style of questioning, with an Cronbach's alpha of the subscales ranging from .54 to .74.

To analyze my hypotheses, several composite variables were used to analyze outgroup contact. These variables focused on how enjoyable interactions were with outgroup members, amount and quality of contact, etc. Quality of contact was defined by creating an average value of pleasant contact, cooperative contact, superficial contact (reverse-scored), uncomfortable contact (reverse-scored), awkward contact (reverse-scored), viewing contact as respectable, viewing contact as meaningful, viewing contact as warm, and viewing contact as competitive (reverse-scored). Quantity of contact was composed of an average value of how often an individual interacts with atheists at events, just chatting, over all social situations, prevalence of atheists in their close friend group, prevalence of atheists in their immediate family, and overall opportunity for contact with atheists. The dependent variables include a 101-point feeling thermometer from 0-100 that identify overall how the individual felt about atheists (adapted from Haddock et al., 1993). Additionally, a previously validated scale, the seven-item negative attitudes toward atheists (NATA, hereafter) scale composed by Gervais and Shariff (2010), was administered as well. The 7-point scale, which includes items such as "I would be uncomfortable with an atheist teaching my child", and "I would not at all be bothered by a [President] who did not have religious beliefs", demonstrated strong reliability, $\alpha = .84$ (Gervais, 2011). To mitigate the potential of order effects, contact, essentialism, and attitude measures were randomized and counter-balanced within the study.

Additionally, attention checks were embedded in the survey, asking participants to select a specific number to ensure they are reading questions. Those who failed more than one (out of a

possible four) of these checks were excluded from analysis. The battery of individual scales as presented in the study are available in Appendix A.

Data was collected using the online data collection software QuestionPro. Data analysis was conducted using IBM's Statistical Package for the Social Sciences (SPSS, v.26), the PROCESS (Hayes, 2020) macro, as well as the statistical package R.

Procedure

Participants from the University of Texas at Arlington's SONA pool completed a prescreening measure, which included demographic and religious identification measures. Individuals who completed the prescreening survey were eligible to register for the present study (in mTurk, a qualifying pre-questionnaire was used). Participants were free to complete the survey using their own computers at a time of their choosing, and after completing the study were given the option to withdraw their data before being granted credit.

Results and Discussion

Hypothesis 1

Descriptive statistics for Sample One (SONA) are presented in Table 3, with intercorrelations of predictors and outcome variables presented in Table 4. For the first hypothesis, it was predicted that higher levels of contact with atheist outgroup members will be associated with more positive attitudes toward atheists. In support of the hypothesis, contact quality was significantly correlated with both overall feelings toward atheists (as measured by a feelings thermometer), ($r(187) = .60, p < .001$) as well as the NATA scale ($r(187) = -.40, p < .001$). Additionally, contact quantity was significantly associated with both overall feelings toward atheists ($r(187) = .21, p = .02$) and the NATA scale ($r(187) = -.25, p = .03$).

For the general population sample (mTurk), descriptive statistics are provided in Table 5, with the intercorrelation matrix provided in Table 6. The results supported the hypothesis. Much like the first sample, contact quality was significantly associated with overall feelings toward atheists ($r(236) = .52, p < .001$), as well as NATA scores ($r(236) = -.51, p < .001$). Likewise, quantity of contact was significantly correlated with both attitudes toward atheists ($r(236) = .44, p < .001$) and the NATA scale ($r(236) = -.14, p = .04$).

Overall, the data from both samples provide support for the hypothesis. Both contact quantity and contact quality are positively associated with overall attitudes and negatively associated with NATA scores (indicating less *negative* attitudes).

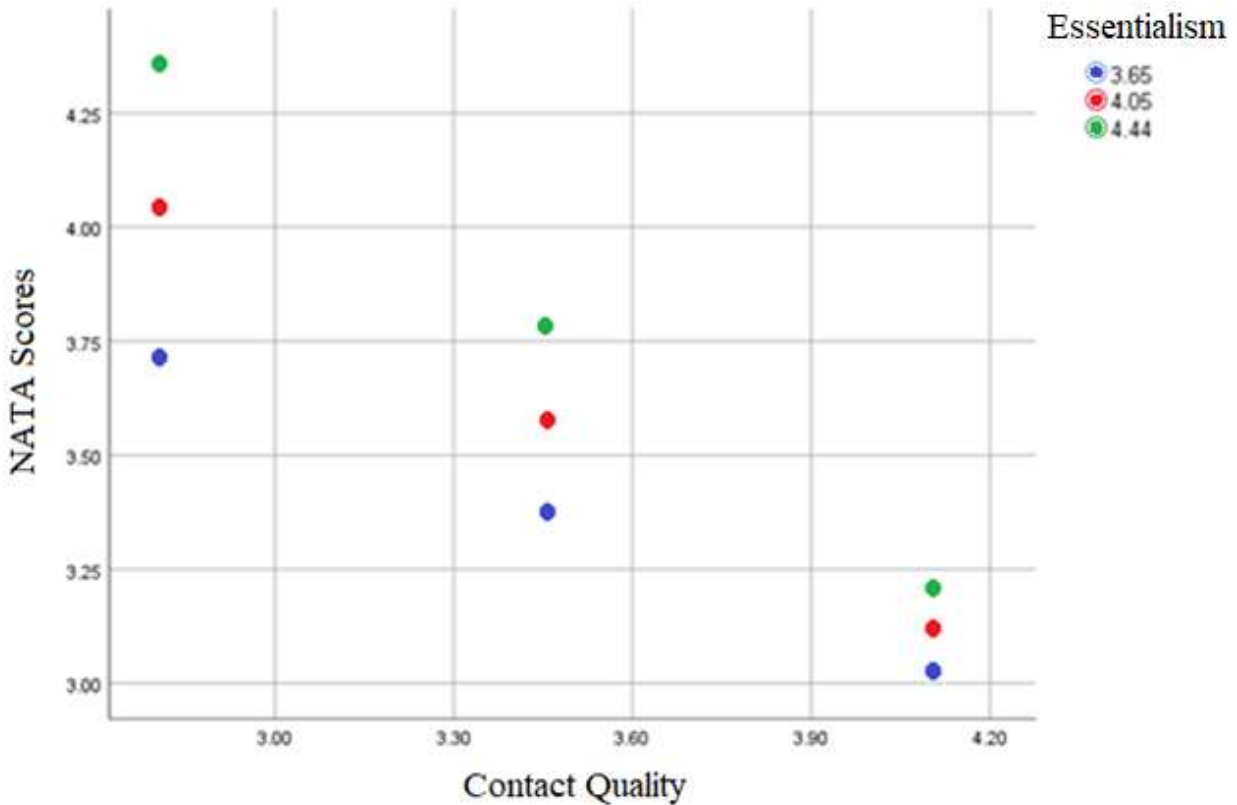
Hypothesis 2

It was hypothesized that psychological essentialism would moderate the relationship between quantity and quality of contact and outgroup attitudes, such that those with high levels of essentialist beliefs would not demonstrate a significant relationship between the two factors, while those with low levels of essentialist beliefs would see the effect of a relationship between contact and attitudes. A Johnson-Neyman approach was utilized in order to determine specific regions of significance within the moderator. Four separate models were run for each sample to assess both quality and quantity of contact as predictors of the feelings thermometer scores as well as composite scores for the NATA scale.

First, the student sample was analyzed. The first model, analyzing the moderating effect between contact quality and NATA scores, was significant overall, $R = .44, R^2 = .19, F(3,183) = 14.53, p < .001$. Contrary to my hypothesis, both contact quality ($p = .30$), and the interaction between essentialism and contact quality ($p = .10$) were not significant, with the effect being driven by essentialism predicting outgroup attitudes ($p = .04$).

Figure 1

Moderating Effect of Essentialism on the Relationship between Contact Quality and NATA scores (SONA)



Note. The blue, red, and green dots represent scores for low ($-1 SD$), mean, and high ($+1 SD$) levels of essentialism, respectively.

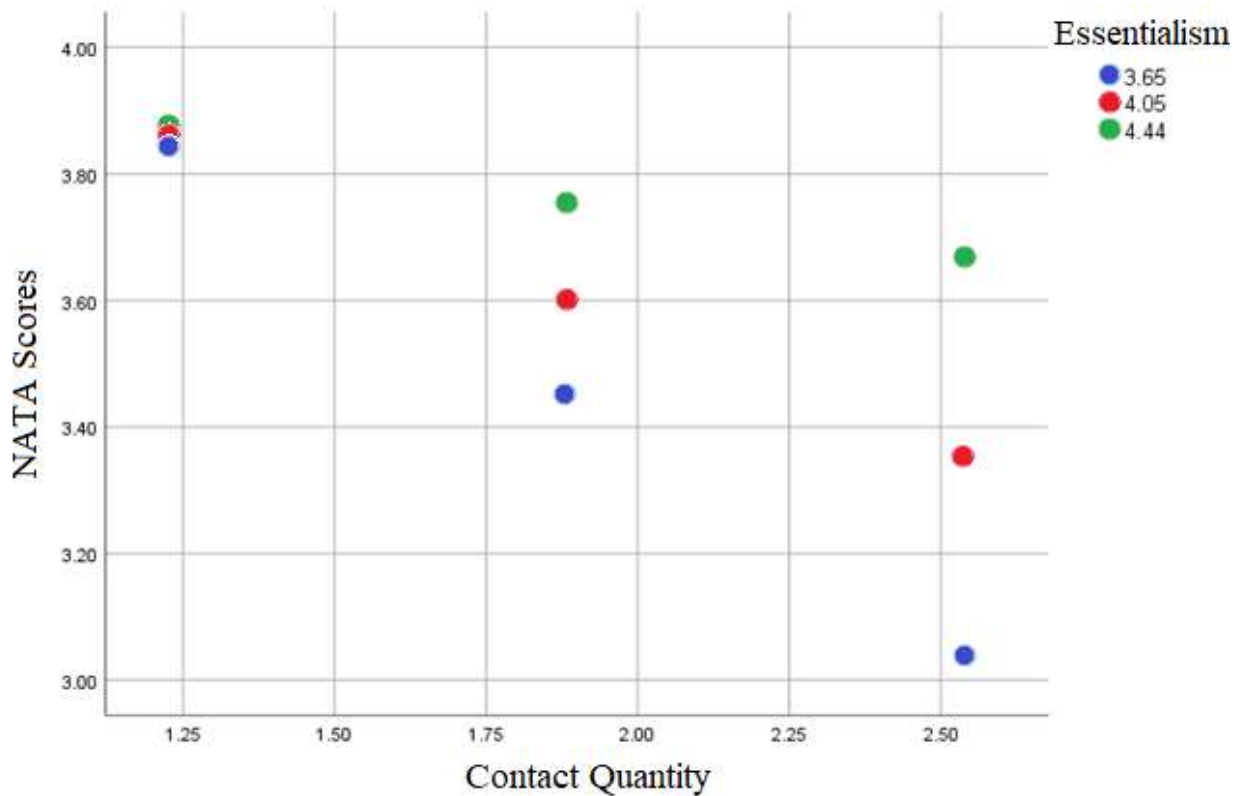
Those who were lowest in essentialist beliefs toward atheists (the bottom 3.21% of the sample) did not have their attitudes change with increased quality of contact, while the remaining 96.79% did exhibit a significant moderating effect (see Figure 1), which again was not in alignment with my original hypothesis.

The second model analyzed the effect of essentialism on the relationship between quantity of contact and NATA scores. Again, the overall model was significant, $R = .33$, $R^2 = .11$, $F(3,183) = 7.48$, $p < .001$. Though essentialism did not serve as an independent predictor ($p = .21$), both contact quantity ($p = .02$) and the interaction term ($p = .04$) were significant. In support of my hypothesis, individuals in the upper 31.55% of the sample in essentialism scores

were not associated with a significant relationship, while those in the lower 68.45% were (see Figure 2).

Figure 2

Moderating Effect of Essentialism on the Relationship between Contact Quantity and NATA scores (SONA)

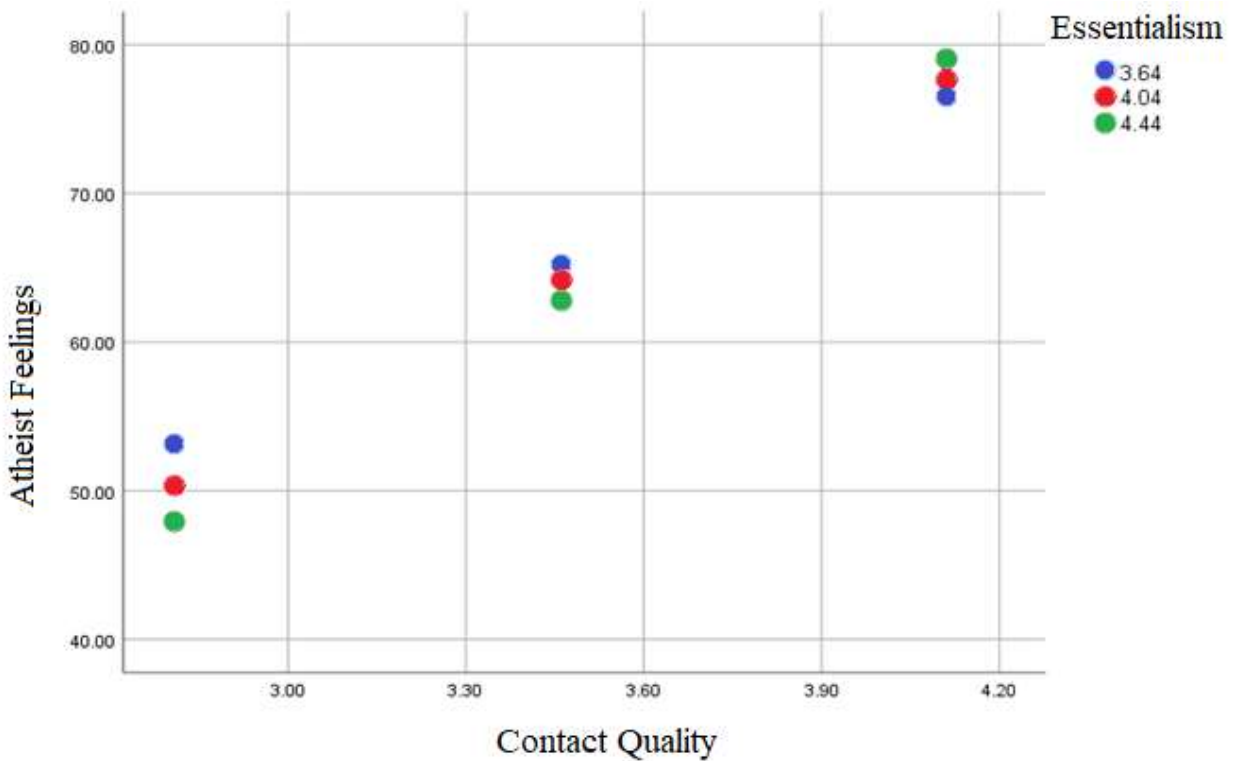


Note. The blue, red, and green dots represent scores for low (-1 *SD*), mean, and high (+1 *SD*) levels of essentialism, respectfully.

The next models use the overall feelings thermometer as the dependent variable. When testing the moderating effect between quality of contact and attitudes, there was a significant overall effect, $R = .61$, $R^2 = .37$, $F(3,184) = 35.79$, $p < .001$ (see Figure 3). Though quality of contact predicted attitudes independently ($p < .001$), essentialism ($p = .14$) and the interaction term ($p = .11$) were non-significant. The lowest 2.41% were not associated with a significant relationship, while the remaining 97.59% were.

Figure 3

Moderating Effect of Essentialism on the Relationship between Contact Quantity and Feelings Thermometer Scores (SONA)

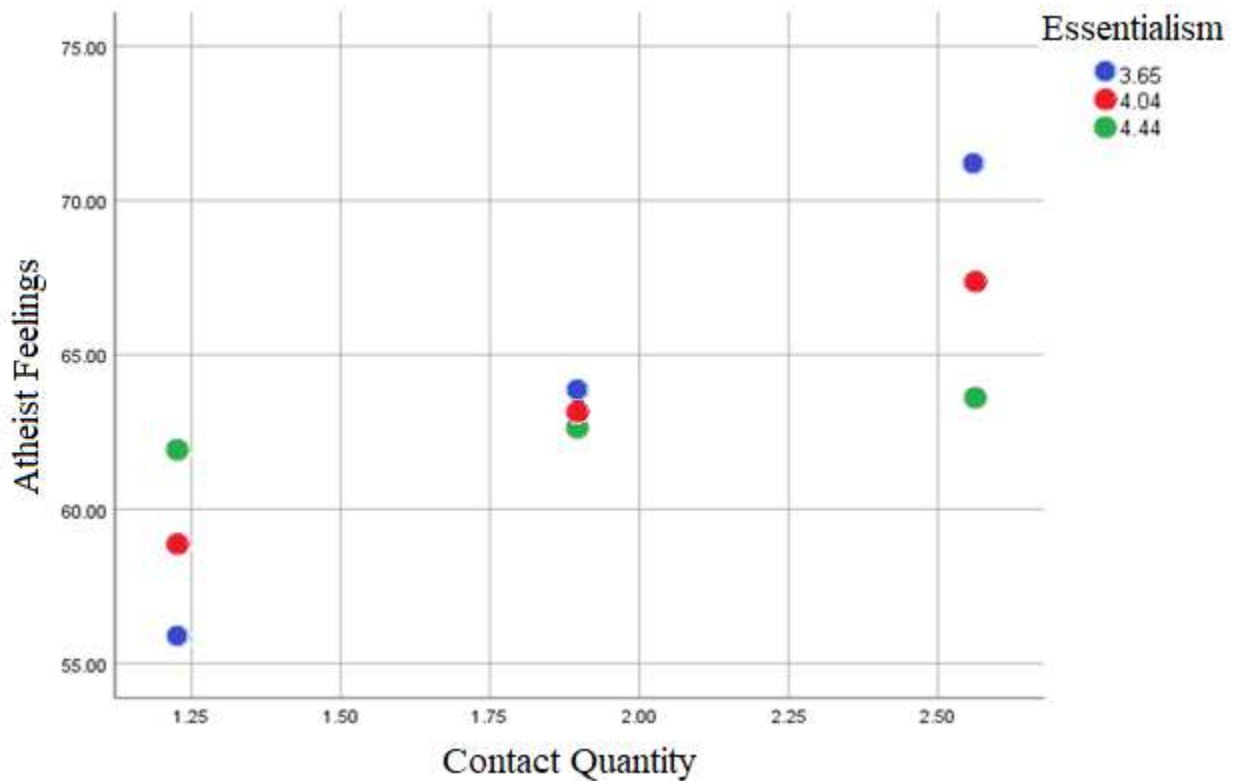


Note. The blue, red, and green dots represent scores for low ($-1 SD$), mean, and high ($+1 SD$) levels of essentialism, respectfully.

Last, the model analyzing the moderating effect of essentialism on the relationship between contact quantity and overall attitudes toward atheists was significant, $R = .26$, $R^2 = .07$, $F(3,184) = 74.62$, $p = .004$. Both contact quantity ($p = .02$) and the interaction term ($p = .03$) significantly predicted attitudes, while essentialism ($p = .07$) was not a significant predictor. In support of my hypothesis, individuals with high levels of essentialism (upper 35.45%) were not associated with a significant relationship, while the lower 64.55% were (see Figure 4).

Figure 4

Moderating Effect of Essentialism on the Relationship between Contact Quantity and Feelings Thermometer (SONA)

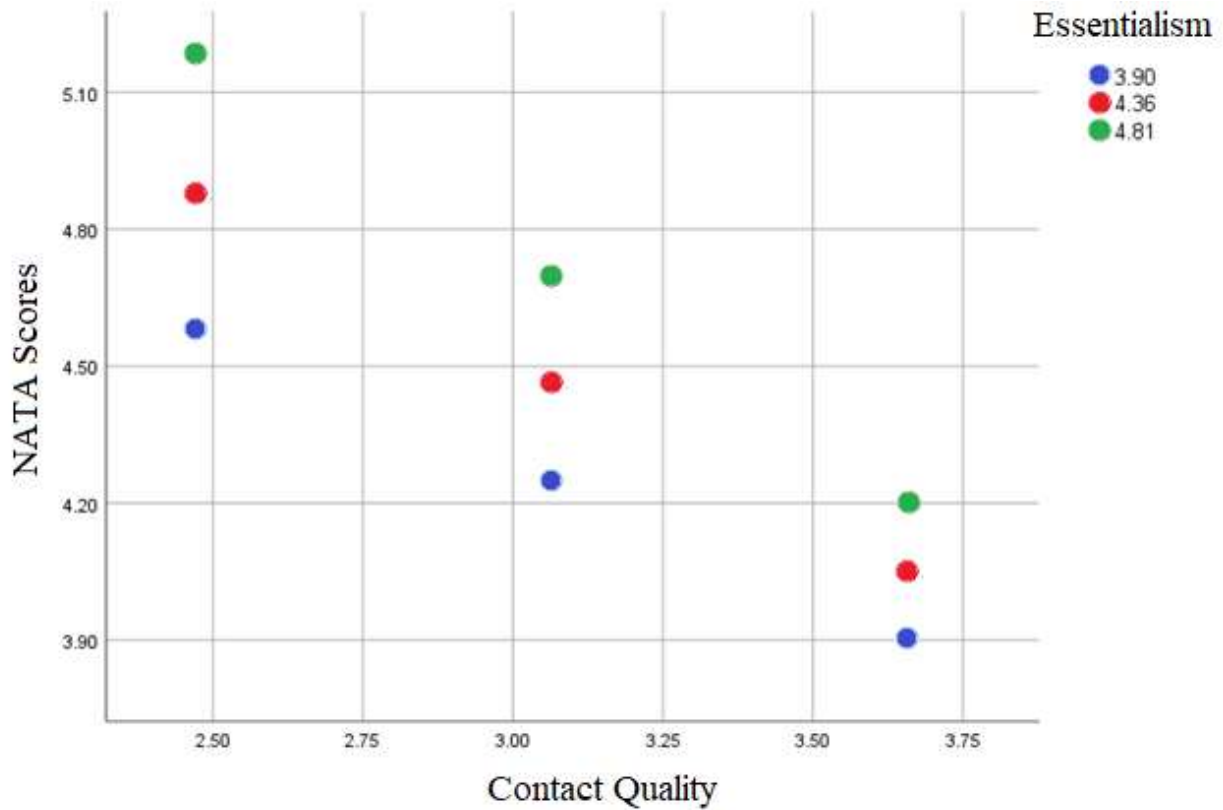


Note. The blue, red, and green dots represent scores for low ($-1 SD$), mean, and high ($+1 SD$) levels of essentialism, respectfully.

Identical models were run for the general population sample (mTurk). Looking at the moderating effect between contact quality and NATA scores, the overall model was significant, $R = .57$, $R^2 = .33$, $F(3,234) = 38.48$, $p < .001$. Similar to the first sample, however, the findings did not support my hypothesis. While both essentialism ($p = .001$), and the interaction between essentialism and contact quality ($p = .03$) significantly predicted NATA scores, those who were lowest in essentialist beliefs toward atheists (the bottom 1.68% of the sample) were not associated with a significant relationship between contact and attitudes, while the remaining 98.32% did exhibit a significant moderating effect (see Figure 5), which again was not in alignment with my original hypothesis.

Figure 5

Moderating Effect of Essentialism on the Relationship between Contact Quality and NATA scores (mTurk)

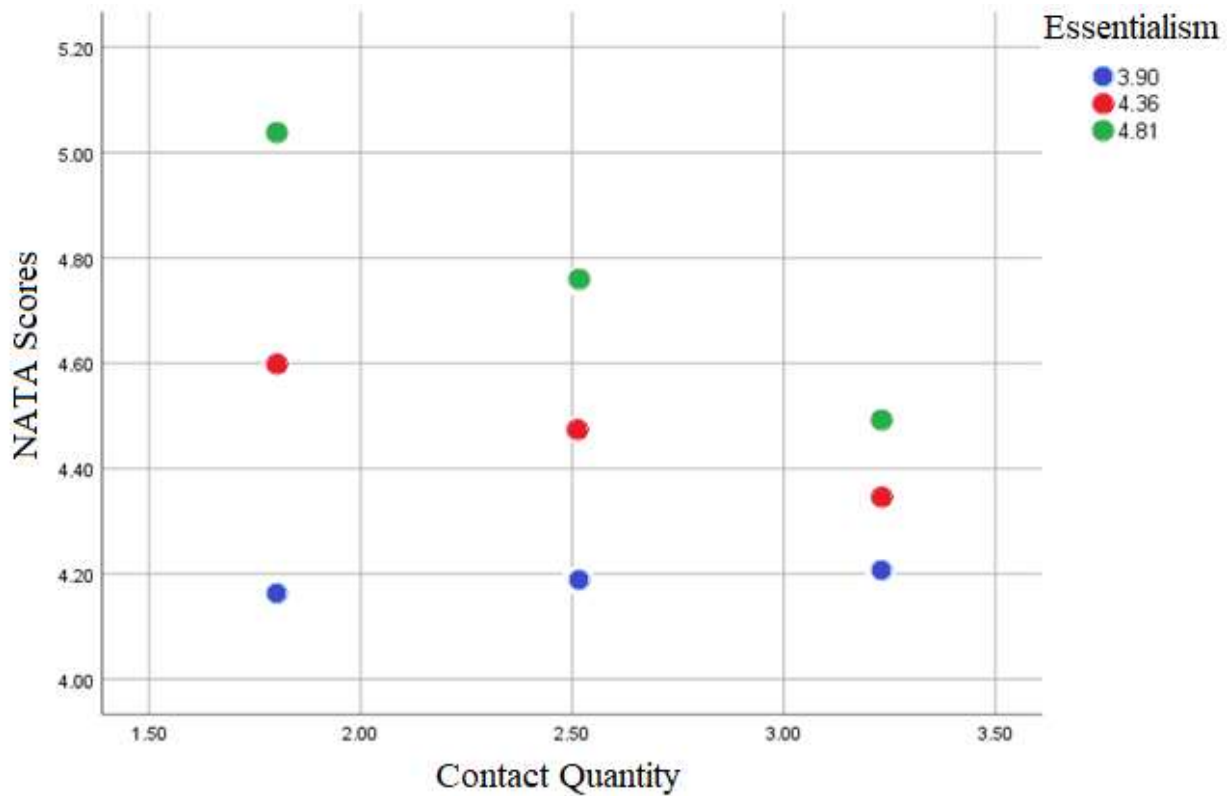


Note. The blue, red, and green dots represent scores for low ($-1 SD$), mean, and high ($+1 SD$) levels of essentialism, respectively.

When analyzing the effect of essentialism on the relationship between quantity of contact and NATA scores, the overall model was again significant, $R = .39$, $R^2 = .16$, $F(3,234) = 14.31$, $p < .001$. Contact quantity ($p = .01$), essentialism ($p < .001$), and the interaction term ($p < .001$) all independently predicted the outcome variable. In partial support of my hypothesis, individuals in the upper 57.98%, as well as the lower 2.52% of the sample in essentialism scores were associated with a significant relationship, while those in the middle 39.50% were not (see Figure 6).

Figure 6

Moderating Effect of Essentialism on the Relationship between Contact Quantity and NATA scores (mTurk)

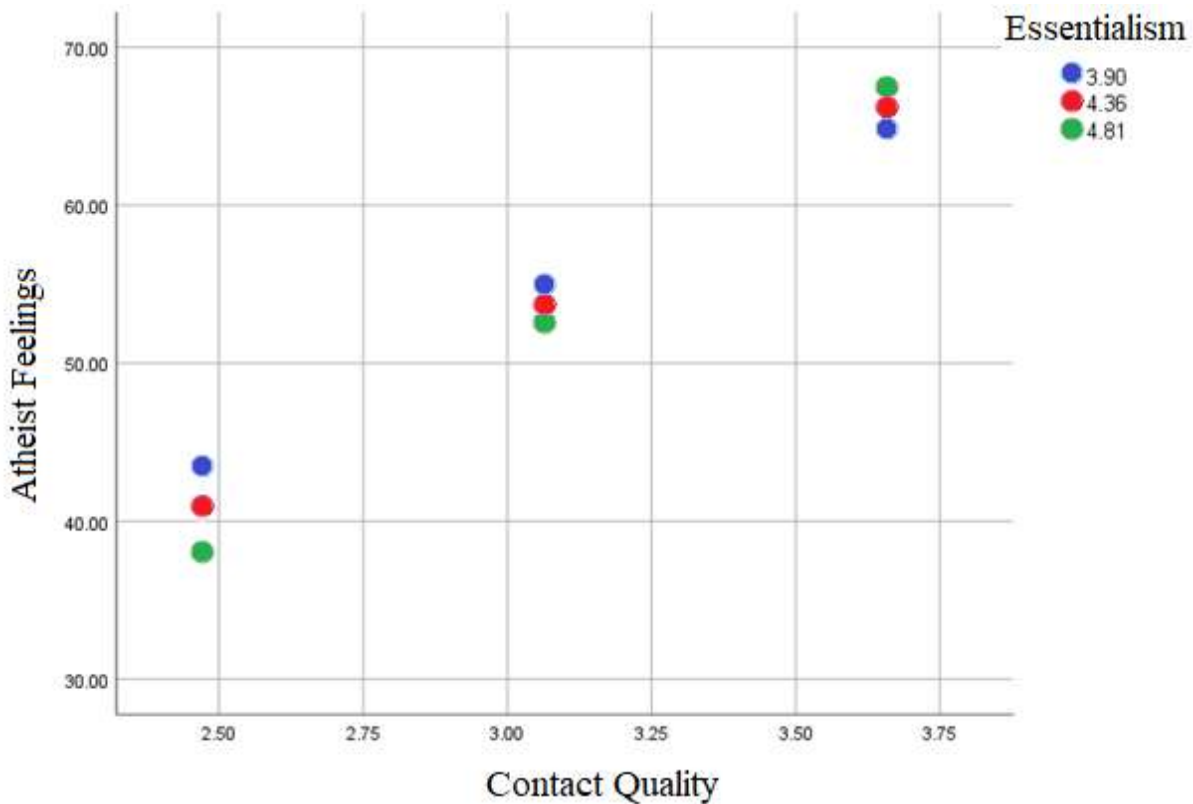


Note. The blue, red, and green dots represent scores for low (-1 *SD*), mean, and high (+1 *SD*) levels of essentialism, respectively.

Analyzing the moderating effect of essentialism on the relationship between quality of contact and attitudes as measured by the feelings thermometer, the overall model was significant, $R = .54$, $R^2 = .29$, $F(3,234) = 14.31$, $p < .001$. Again, essentialism ($p = .04$) and the interaction term ($p = .049$) both significantly predicted attitudes independently, while contact quality did not ($p = .49$). The lowest 1.26% were not impacted by the moderator variable, while the remaining 98.74% were (see Figure 7).

Figure 7

Moderating Effect of Essentialism on the Relationship between Contact Quality and Feelings Thermometer (mTurk)



Note. The blue, red, and green dots represent scores for low (-1 *SD*), mean, and high (+1 *SD*) levels of essentialism, respectfully.

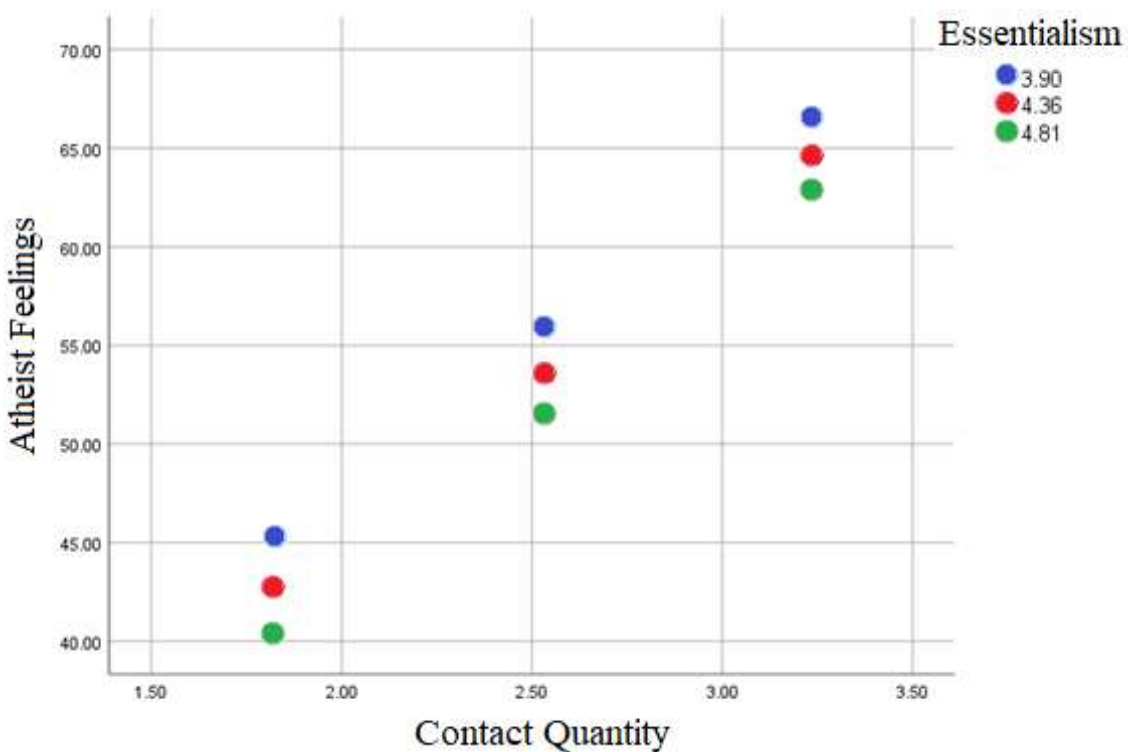
Finally, the impact of essentialism on the relationship between quantity of contact and attitudes was measured. The overall model was significant, $R = .45$, $R^2 = .20$, $F(3,234) = 20.69$, $p < .001$ (see Figure 8). The effect was driven by contact quantity ($p < .01$), with essentialism ($p = .42$) and the interaction term ($p = .31$) not significantly predicting the outcome variable. Similar to other models, the bottom 4.34% were not affected by the moderating variable, while the remaining 95.66% of the sample saw a significant effect.

Overall, while essentialism served as an effective moderator in the majority of the models, the data did not fully support my hypothesis. Specifically, when individuals were low in essentialism, contact was not significantly associated with outgroup attitudes. It is possible that

individuals who possessed low essentialist beliefs simply did not harbor negative attitudes toward atheists to begin with. Another factor to consider, however, is that only a small portion of the sample did not exhibit significant attitude change as a result of essentialism interacting with the predictor variable.

Figure 8

Moderating Effect of Essentialism on the Relationship between Contact Quantity and Feelings Thermometer (mTurk)



Note. The blue, red, and green dots represent scores for low (-1 *SD*), mean, and high (+1 *SD*) levels of essentialism, respectfully.

Hypothesis 3

Last, it was hypothesized that essentialism will moderate the relationship between contact and prejudice above and beyond the effects of religious fundamentalism and quest religiosity. I utilized a multiple-moderated regression with religious fundamentalism and quest religiosity entered into step 1, and the respective predictor, essentialism, and the interaction term entered

into step 2. Again, four separate models were run for each sample measuring both contact quality and quantity on the dependent variables (NATA and the feelings thermometer).

I first ran analyses for the SONA sample. For the first model, I tested whether essentialism moderated the relationship between contact quality and attitudes measured using the feelings thermometer above and beyond that of quest religiosity and religious fundamentalism. The overall model was significant, with religious fundamentalism significantly predicting attitudes. Additionally, in support of the hypothesis, step 2 predicted attitudes above and beyond that of religious fundamentalism and quest religiosity, accounting for an additional 28.1% of variance (see Table 7 for complete regression results).

For the next model, I analyzed the effect of essentialism on the relationship between contact quantity and attitudes controlling for quest religiosity and religious fundamentalism. Again, the overall model was significant, with both religious fundamentalism and contact quantity predicting attitudes toward atheists. In alignment with the hypothesis, step 2 predicted attitudes above and beyond that of quest religiosity and religious fundamentalism, accounting for an additional 4.2% of the variance in the model (see Table 8 for complete regression results).

Next, I examined the effects with the NATA scale as the dependent variable. First, I analyzed the moderating effect between contact quality and NATA scores. Similar to the previous models, this model was also significant overall, with religious fundamentalism predicting NATA scores, and step 2 predicting NATA scores above and beyond that of religious fundamentalism and quest religiosity, accounting for 3.5% of variance (see Table 9 for complete regression results).

For the final model for sample one, I analyzed the moderating effect between contact quantity and NATA scores. Religious fundamentalism again predicted NATA scores, as did

contact quantity. The overall model was significant, with step 2 predicting NATA scores above and beyond that of quest religiosity and religious fundamentalism, providing an additional 2.2% of explained variance (see Table 10 for complete regression results).

For the general population sample (mTurk), I ran identical models as for sample one. Testing if essentialism moderated the relationship between contact quality and attitudes measured using the feelings thermometer above and beyond that of quest religiosity and religious fundamentalism, the overall model was significant. Additionally, both quest religiosity and religious fundamentalism significantly predicted attitudes independently. In support of the hypothesis, step 2 predicted attitudes above and beyond that of religious fundamentalism and quest religiosity, accounting for an additional 21.0% of variance (see Table 11 for complete regression results).

Analyzing the effect of essentialism on the relationship between contact quantity and attitudes, again, the overall model was significant. Both quest religiosity and religious fundamentalism significantly predicted attitudes independently, and step 2 accounted for an additional 8.4% of variance when controlling for quest religiosity and religious fundamentalism (see Table 12 for complete results).

Focusing on NATA scores as the dependent variable, similar results were present when looking at the effect of the moderator when controlling for quest religiosity and religious fundamentalism on the relationship between quality of contact and attitudes. Religious fundamentalism and essentialism significantly predicted the outcome variable independently. Additionally, step 2 of the model accounted for an additional 12.2% of variance explained (see Table 13 for complete results).

Last, I examined the moderating effect on the relationship between quantity of contact and attitudes. The overall model was significant, with religious fundamentalism, essentialism, contact quantity, as well as the interaction all significantly predicting levels of the outcome variable. When controlling for fundamentalism and quest religiosity, step 2 accounted for an additional 5.0% of variance in the model (see Table 14 for complete results).

Overall, the models incorporating essentialism and quantity and quality of contact served as significant predictors above and beyond quest religiosity and religious fundamentalism. These findings are in support of the original hypothesis, and are evident with both measures of the dependent variable.

Study Two

Method

The second study was largely similar to Study One in scope. The novelty of Study Two stems from the introduction of an experimental manipulation, which is intended to create high and low levels of psychological essentialism toward the atheist outgroup.

Participants

For this sample, 250 participants were recruited from the general population using the data collection site prolific.co. As was required in study one, participants must be a United States citizen, over the age of 18, and identify as a Christian to be eligible for the study. Two participants (0.8%) were excluded for failing more than one attention check or manipulation check, and ten participants (4%) were excluded for identifying as a religion other than Christianity (which must have been their identified religion in their Prolific profile in order to have been eligible for the study). The net sample size was 238 participants (predominantly

Caucasian (52.3%), male (54.9%), Democratic (51.1%), and Catholic (55.6%) with a mean age of 33.40 years ($SD = 9.59$) - see Table 15 for complete demographics).

For their participation in the study, participants were compensated \$3.75. If at any time throughout the process participants wished to withdraw from the study, they were free to do so without penalty and were permitted to receive partial credit.

Measures and Materials

All individual difference scales that were measured in Study One appear in Study Two, with the exception of the omission of the Ten Item Personality Inventory and the 12 item Religious Fundamentalism Scale, and the addition of an experimental manipulation. Due to errors that occurred in the data collection software QuestionPro, these items were programmed into the survey but not administered to participants. Nine of the original items in the religious fundamentalism scale were unaffected, and a reliability analysis was conducted to determine if this was problematic to use as a scale. The Cronbach's alpha for the nine items was $\alpha = .91$, well above acceptable standards. Thus, for the experimental study, a 9-item measure was used. The manipulation is intended to lead to high and low levels of psychological essentialism using a scientific news article (adapted from Williams & Eberhardt, 2008) that states that the lack of belief in god is either an inherent trait (high condition), or not (low condition) (see Appendix B).

Additionally, qualitative manipulation checks, including open-ended summary responses regarding the content of the fictional news article, was presented immediately following the manipulation. If deemed by independent coders to be unsatisfactory in their responses, individuals who could not summarize the article was excluded from analysis.

Procedure

Similar to Study One, participants who were eligible to take the study could accept the task. Participants were free to complete the survey using their own computers at a time of their choosing, and after completing the study were given the option to withdraw their data before being granted credit.

Several manipulation check items were presented to participants after exposure to the manipulation, which was completed prior to any individual difference measures. Three open-ended items, including ‘In a sentence or two, what was the article you read about?’, ‘What was your reaction to the article?’, and ‘Do you remember the source of the article?’ were first presented, the later two serving as filler questions. Independent raters rated the responses of the article content question as satisfactory or not, with those who did not adequately summarize the article being excluded from analyses. Additionally, a question asking for an estimate of time spent reading the article was presented, which was compared to actual time spent as recorded by QuestionPro software. Lastly, several true/false questions, including ‘The researchers found that a person's genes determine whether they were an atheist or not’, and ‘The researchers also study the genetic basis for depression’ were presented. Responses for the first item were dependent on condition, and those that did not respond in agreement with their condition were excluded from analyses. Likewise, those who failed the second item were also excluded if they provided an incorrect response. Upon completing the study, participants were debriefed and given the option to have their data excluded from analyses.

Results and Discussion

Manipulation checks were first coded to ensure that participants read the article and had at least a fundamental understanding of the article they were presented. Coders rated the

responses on a scale of 0-2, with '0' indicating a lack of understanding about the article or incorrect response (e.g., 'it was about racism'), a basic understanding of the article (e.g., 'it was about religion and genetics'), or a thorough understanding of the article (e.g., 'it was about using genetic markers to predict someone's religious identity later in life'). The interrater reliability of a random sample of the data was strong, $IRR = .84$, which increased to $IRR = .96$ when data was transcoded into a dichotomous variable (no understanding of article/understanding of article). The remaining data was then coded by a single individual.

An exploratory analysis on the effectiveness of the experimental manipulation was conducted to determine what differences, if any, existed in essentialist beliefs (composite scale of fifteen items, $\alpha = .46-.86$ across samples) based on the condition of participants. An independent samples t -test was used to examine any effect. The result was non-significant, ($t(235) = .70, p = .49$), indicating there was no difference between experimental ($N = 126, M = 4.40, SD = .52$) and control ($N = 111, M = 4.35, SD = .55$) conditions. Additional analyses showed no significant differences on any of the subscales of essentialism based on condition. These findings demonstrate that the experimental manipulation was not effective.

To attempt to remediate this issue, believability was coded for an ancillary analysis. Similar procedures were used with the open-ended question asking for thoughts about the study, coding on a 0-2 scale, with '0' indicating no suspicion (e.g. 'I thought it was interesting'), '1' indicating some suspicion (e.g. 'I found this article hard to believe'), and '2' indicating high levels of suspicion (e.g. 'there is no way that religion is tied to genetics'). Though this coding was used to potentially remove those who did not believe the manipulation, it was not ideal, as participants were not explicitly asked about believability- thus, participants who were coded as '0' could have also harbored significant doubt about the study, but chose not to disclose it.

Nevertheless, the interrater reliability of the random sample was a respectable $IRR = .71$, with the remainder being coded by a single individual. Analyses were conducted with and without removing suspicious individuals, and no significant differences were found. Thus, in the following results, the reported analyses utilize the entirety of the post-screened data.

Descriptive statistics for the sample are presented in Table 16, with intercorrelations of predictors and outcome variables presented in Table 17. For the first hypothesis, it was predicted that higher levels of contact (both increased frequency and more positive contact) with atheist outgroup members will be associated with more positive attitudes toward atheists (measured as higher overall feelings toward atheists and lower NATA scores). In support of the hypothesis, contact quality was significantly correlated with both overall feelings toward atheists ($r(235) = .61, p < .001$) as well as the NATA scale scores ($r(235) = -.42, p < .001$). Additionally, contact quantity was significantly associated with both overall feelings toward atheists ($r(235) = .38, p = .02$) and the NATA scale ($r(235) = -.22, p = .001$).

These findings support the hypothesis that positive and more frequent contact are associated with more positive attitudes toward atheist outgroup members.

Hypothesis 2

To test the hypothesis that essentialism conditions would moderate the relationship between contact and attitudes, a linear regression analysis was conducted. First, dummy codes were created for the interaction between condition and moderator. Then, a stepwise model was conducted to determine what effect, if any, the interaction between moderator and independent variable had on the outcome variable.

When looking at the NATA scores as the outcome variable, I first analyzed the moderating effect on the independent variable of contact quality. While contact quality was a

significant predictor in the model ($p < .001$), the moderation effect was not significant, $\Delta F(1,233) = .71, p = .40, \Delta R^2 = .00$. Similarly, examining the impact of essentialism on the relationship between contact quantity and NATA scores, there was also a non-significant effect, $\Delta F(1,233) = .73, p = .73, \Delta R^2 = .00$.

Analyzing the same variables when looking at the overall feelings thermometer as an outcome variable, a similar pattern emerged. Again, while contact quality predicted the outcome variable ($p < .001$), the moderator did not significantly impact the relationship, $\Delta F(1,233) = .02, p = .88, \Delta R^2 = .00$. Similarly, when replacing quality of contact with quantity of contact in the model, the effect was non-significant, $\Delta F(1,233) = .10, p = .75, \Delta R^2 = .00$.

Hypothesis 3

The final hypothesis for Study Two predicted that the condition of essentialism (high v. low) would moderate the relationship between contact and outgroup attitudes above and beyond that of religious fundamentalism and quest religiosity. To test this, I conducted a hierarchical regression model, with quest religiosity, religious fundamentalism, and the predictor in step one, and the essentialism condition and interaction term in step two. I then ran several models with both quality and quantity of contact as predictors and NATA scores and overall feelings as outcome variables.

When testing the effect on the relationship between quality of contact and overall feelings toward atheists, the effect was nonsignificant, with essentialism condition explaining no additional variance above that of quest religiosity and religious fundamentalism ($\Delta F(2,231) = .10, p = .62, \Delta R^2 = .00$). Likewise, when quantity of contact replaced quality in the model, the effect was also non-significant, $\Delta F(2,231) = .23, p = .74, \Delta R^2 = .00$.

Utilizing the NATA scale as the dependent measure, similar results were uncovered. Analyzing the moderating effect between quality of contact and NATA scores, there was no significant effect, $\Delta F(2,231) = .10, p = .62, \Delta R^2 = .00$. Additionally, when quantity of contact was used in the model, a similar non-significant effect was present ($\Delta F(2,231) = 2.36, p = .09, \Delta R^2 = .01$). Overall, the hypothesis was not supported. This lack of findings can be explained by the previously discussed issues regarding the lack of an effective manipulation.

Exploratory Analyses

Additional exploratory analyses were conducted on the effect of condition on attitudes toward atheists. NATA scores, overall feelings, and perception of morality were not impacted by experimental condition.

Overall attitudes toward atheists were impacted by the sample, $F(2,662) = 14.98, p < .001$. Individuals collected from the university sample (SONA) rated feelings toward atheists ($M = 63.51, SD = 22.43$) significantly higher than those from both mTurk ($M = 53.32, SD = 25.03$) and Prolific ($M = 51.16, SD = 25.06$), with both comparisons significant at the $p < .001$ level. This difference can potentially be explained by college students typically being more accepting to outgroups comparative to the general population (Henderson-King & Kaleta, 2000).

Additionally, exploratory analyses were conducted using individual difference measures collected in both studies. Specifically, religious fundamentalism, which has been shown to be a significant predictor of outgroup prejudice (Altemeyer & Hunsberger, 1992), was examined as an additional moderator in the relationship between contact and NATA scores. In the experimental sample, for contact quality, the overall model was significant ($p < .001$), with contact quality, religious fundamentalism, and the interaction term significantly predicting NATA scores at the $p < .01$ level. For contact quantity, while the overall model was significant

($p < .001$), neither contact quantity nor the interaction were significant, while religious fundamentalism independently predicted NATA scores ($p < .001$).

For the mTurk sample, similar results were evident. The model of religious fundamentalism moderating the relationship between contact quality and NATA scores was statistically significant ($p < .001$), with contact quality predicting attitudes ($p < .001$), religious fundamentalism not serving as a significant predictor ($p = .12$), and a significant interaction ($p = .02$). Again, using contact quantity in the model, the overall model was significant ($p < .001$), with quantity ($p = .04$) and religious fundamentalism ($p < .001$) both predicting NATA scores. The interaction ($p = .11$), however, was not significant.

For the SONA sample, the overall model of religious fundamentalism moderating the relationship between contact quality and NATA scores was significant ($p < .001$). Contact quality predicted attitudes ($p = .03$), as did religious fundamentalism ($p = .01$), but the interaction was not statistically significant ($p = .14$). Using contact quantity in the model, the overall model was significant ($p < .001$), with religious fundamentalism ($p < .001$) predicting NATA scores, but contact quantity ($p = .11$) and the interaction ($p = .32$) were non-significant.

Additionally, symbolic threat (adapted from Tausch et al., 2007) was analyzed as a potential moderating variable as well. In the experimental condition, symbolic threat did not significantly moderate the relationship between quality and NATA scores, with quantity ($p = .04$) predicting NATA scores, but symbolic threat ($p = .19$) and the interaction ($p = .28$) being non-significant. Similarly, with quality of contact, there was not a significant moderation. Quality ($p = .24$) and the interaction ($p = .70$) were non-significant predictors, with only symbolic threat ($p = .01$) independently predicting NATA scores.

In the mTurk sample, there was a significant effect of symbolic threat moderating the relationship between contact quantity and NATA scores. In this model, both quantity ($p < .001$) and symbolic threat ($p < .001$) predicted the outcome variable, as well as the interaction ($p < .001$). This effect, however, was not evident for the model utilizing quality of contact, where quality ($p = .07$) did not significantly predict the outcome variable, symbolic threat ($p = .01$) was a significant predictor, and the interaction ($p = .79$) was non-significant.

For the SONA sample, while contact quality ($p = .04$) predicted NATA scores, neither symbolic threat ($p = .32$) nor the interaction ($p = .62$) were significant predictors. Using contact quantity in the model, neither quality ($p = .11$) nor symbolic threat ($p = .09$) significantly predicted NATA scores, nor was there a significant interaction ($p = .66$). Given the mixed results, it is difficult to draw a conclusion about the effectiveness of symbolic threat as a moderator between contact and attitudes. Further research is warranted at this time.

Finally, though essentialism was not a significant moderator in study two, likely due to issues with the manipulation, the individual difference measure of essentialism was still collected, and thus was able to be analyzed as a continuous moderator. When looking at the effect on the relationship between quality of contact and attitudes, the effect was not significant, with quality ($p = .17$) and essentialism ($p = .49$) not significantly predicting overall attitudes as measured by a feelings thermometer, with the interaction ($p = .93$) also being non-significant. Similarly, with quantity of contact, neither quantity ($p = .41$) nor essentialism ($p = .13$) predicted the outcome variable, with the interaction also being non-significant ($p = .70$). Though essentialism was measured in this sample, it is possible the presence of the essentialism manipulation influenced participant responses.

General Discussion

The overall objective of the present study was to provide contributions to the field of social psychology regarding the application of contact theory to a novel outgroup and analyze the potential moderating effects of psychological essentialism within this relationship. In support of hypothesis one, and in alignment with previous literature (e.g., Pettigrew & Tropp, 2000), both quality and quantity of contact was positively associated with attitudes toward outgroup members. Specifically, when contact with atheists was more frequent and more positive, attitudes toward atheists were more positive as well.

Though psychological essentialism served as a useful moderator in several models, support for the second and third hypotheses was mixed. While in some models the relationship between contact and attitudes was not significant for those low in essentialism, other models demonstrated that the relationship was significant regardless of whether the individual was high or low in essentialism. Additionally, while essentialism served as a significant predictor above and beyond quest religiosity and religious fundamentalism, the results were not replicable in the experimental study. These issues likely stem from the lack of an effective experimental manipulation, which makes it difficult to draw any causal effects from the data. Future research is needed at this time to determine the effect of essentialism on the relationship between contact and attitudes.

Limitations and Future Directions

As previously noted, the major limitation of Study Two was the lack of an effective experimental manipulation. While genetics may be passable as an explanation for sexual identity, a number of participants in the experimental condition expressed some form of doubt that genetics would be able to predict religious beliefs. A more effective manipulation may focus

more on personality- for instance, that atheists do not choose to be non-religious, but tend to be individuals who are high in need for cognition and information based on evidence. Such an approach would still promote essentialist beliefs regarding atheists, but would do so more within the realm of believability. Regardless, given the difficulty in manipulating essentialism, any experimental approach should be piloted to determine the effectiveness of the manipulation.

Additionally, contact with atheists is an inherently difficult concept to measure. Unlike various ethnic groups, and in some situations, religious groups or one's own nationality, atheism is an easily concealable group membership. Being able to knowingly communicate with an atheist typically means a tacitly more intimate relationship with an individual, thus complicating the ability to measure the entirety of the spectrum of quality and quantity of contact.

Though there were shortcomings to the study, the results that were found are beneficial in several ways. First, highlighting that increased contact is associated with improved overall outgroup attitudes can provide an important first step in research that focuses on predicting attitude change. Though many groups face adversity in the United States and abroad, and this adversity varies in gravity, broadening the research that focuses on what factors are associated with negative attitudes toward atheists is an important step to improving intergroup relations. Additionally, understanding why these negative attitudes exist in the first place is also important. Though the findings of the present study did not consistently demonstrate psychological essentialism as a moderating factor between contact and attitudes, it does highlight the potential for future research.

References

- Agadullina, E. R., & Lovakov, A. V. (2018). Are people more prejudiced towards groups that are perceived as coherent? A meta-analysis of the relationship between out-group entitativity and prejudice. *British Journal of Social Psychology, 57*(4), 703-731.
- Allport, G. (1954). *The nature of prejudice*. Cambridge, MA: Addison-Wesley
- Allport, G. W., & Ross, J. M. (1967). Personal religious orientation and prejudice. *Journal of Personality and Social Psychology, 5*, 432. <http://dx.doi.org/10.1037/h0021212>
- Altemeyer, B., & Hunsberger, B. (1992). Authoritarianism, religious fundamentalism, quest, and prejudice. *International Journal for the Psychology of Religion, 2*(2), 113-133.
- Altemeyer, B., & Hunsberger, B. (2004). A revised religious fundamentalism scale: The short and sweet of it. *International Journal for the Psychology of Religion, 14*, 47-54.
doi:10.1207/s15327582ijpr1401_4
- Batson, C. D. (1976). Religion as prosocial: Agent or double agent? *Journal for the Scientific Study of Religion, 29*-45. doi: 10.1177/01461672962210010
- Batson, C. D. & Schoenrade, P. A. (1991). Measuring religion as a quest: 2.) Reliability concerns. *Journal of Scientific Study of Religion, 30*, 430-447.
doi: 10.1177/01461672962210010
- Brewer, M. B. (1979). In-group bias in the minimal intergroup situation: A cognitive-motivational analysis. *Psychological Bulletin, 86*(2), 307. <https://doi.org/10.1037/0033-2909.86.2.307>

- Crandall, C. S., Eshleman, A., & O'Brien, L. (2002). Social norms and the expression and suppression of prejudice: The struggle for internalization. *Journal of Personality and Social Psychology, 82*, 359-378. doi.org/10.1037/0022-3514.82.3.359
- Demoulin, S., Leyens, J. P., & Yzerbyt, V. (2006). Lay theories of essentialism. *Group Processes & Intergroup Relations, 9*(1), 25-42.
- Effron, D. A., & Knowles, E. D. (2015). Entitativity and intergroup bias: How belonging to a cohesive group allows people to express their prejudices. *Journal of Personality and Social Psychology, 108*(2), 234.
- Gallup (2015, June 17). Religion. Retrieved November 22, 2019, from <http://www.gallup.com/topic/religion.aspx>
- Gelman, S. A. (2003). *The essential child: Origins of essentialism in everyday thought*. Oxford University Press, USA.
- Gervais, W. M. (2011). Finding the faithless: Perceived atheist prevalence reduces anti-atheist prejudice. *Personality and Social Psychology Bulletin, 37*, 543-556.
doi:10.1177/0146167211399583
- Gervais, W. M. (2014). Everything is permitted? People intuitively judge immorality as representative of atheists. *PloS one, 9*(4), e92302. doi.org/10.1371/journal.pone.0092302
- Gervais, W. M., & Shariff, A. F. (2010). [The Negative Attitudes Towards Atheists Scale: Psychometric properties, reliability, and validity]. Unpublished raw data.
- 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*, 1189-1206. dx.doi.org/10.1037/a0025882

- Haddock, G., Zanna, M. P., & Esses, V. M. (1993). Assessing the structure of prejudicial attitudes: The case of attitudes toward homosexuals. *Journal of Personality and Social Psychology, 65*(6), 1105.
- Hall, D. L., Matz, D. C., & Wood, W. (2010). Why don't we practice what we preach? A meta-analytic review of religious racism. *Personality and Social Psychology Review, 14*, 126-139. doi: 10.1177/1088868309352179
- Haslam, N., & Levy, S. R. (2006). Essentialist beliefs about homosexuality: Structure and implications for prejudice. *Personality and Social Psychology Bulletin, 32*(4), 471-485.
- Haslam, N., Rothschild, L., & Ernst, D. (2000). Essentialist beliefs about social categories. *British Journal of Social Psychology, 39*(1), 113-127.
- Hayes, A. F. (2020). PROCESS Macro [Computer software]. Retrieved from <http://www.processmacro.org/index.html>
- Henderson-King, D., & Kaleta, A. (2000). Learning about social diversity: The undergraduate experience and intergroup tolerance. *The Journal of Higher Education, 71*(2), 142-164. doi:10.1080/00221546.2000.11778832
- Hewstone, M., Clare, A., Newheiser, A. K., & Voci, A. (2011). Individual and situational predictors of religious prejudice: Impact of religion, social dominance orientation, intergroup contact, and mortality salience. *Testing, Psychometrics, Methodology in Applied Psychology, 18*(3), 143-155.
- Hollander, B. A. (2010). Persistence in the perception of Barack Obama as a Muslim in the 2008 presidential campaign. *Journal of Media and Religion, 9*(2), 55-66.
- Hunsberger, B., & Jackson, L. M. (2005). Religion, meaning, and prejudice. *Journal of Social Issues, 61*, 807-826. doi: 10.1111/j.1540-4560.2005.00433.x

- Islam, M. R., & Hewstone, M. (1993). Dimensions of contact as predictors of intergroup anxiety, perceived out-group variability, and out-group attitude: An integrative model. *Personality and Social Psychology Bulletin*, 19(6), 700-710. doi:10.1177/0146167293196005
- Johnson, M. K., Labouff, J. P., Rowatt, W. C., Patock-Peckham, J. A., & Carlisle, R. D. (2012). Facets of right-wing authoritarianism mediate the relationship between religious fundamentalism and attitudes toward Arabs and African Americans. *Journal for the Scientific Study of Religion*, 51(1), 128-142. doi:/10.1111/j.1468-5906.2011.01622.x
- Laythe, B., Finkel, D. G., Bringle, R. G., & Kirkpatrick, L. A. (2002). Religious fundamentalism as a predictor of prejudice: A two-component model. *Journal for the Scientific study of Religion*, 41(4), 623-635. doi:10.1111/1468-5906.00142
- Lytle, A., Dyar, C., Levy, S. R., & London, B. (2017). Essentialist beliefs: Understanding contact with and attitudes towards lesbian and gay individuals. *British Journal of Social Psychology*, 56(1), 64-88. doi:10.1111/bjso.12154
- Kanas, A., Scheepers, P., & Sterkens, C. (2015). Interreligious contact, perceived group threat, and perceived discrimination: Predicting negative attitudes among religious minorities and majorities in Indonesia. *Social Psychology Quarterly*, 78(2), 102-126. doi:10.1177/0190272514564790
- Pettigrew, T. F., & Tropp, L. R. (2000). Does intergroup contact reduce prejudice? Recent meta-analytic findings. *Reducing Prejudice and Discrimination*, 93, 114.
- Pettigrew, T. F., & Tropp, L. R. (2006). A meta-analytic test of intergroup contact theory. *Journal of Personality and Social Psychology*, 90(5), 751. doi:10.1037/0022-3514.90.5.751

- Rios, K., Halper, L. R., & Scheitle, C. P. (2021). Explaining anti-atheist discrimination in the workplace: The role of intergroup threat. *Psychology of Religion and Spirituality*. doi:10.1037/rel0000326
- Rowatt, W. C., LaBouff, J., Johnson, M., Froese, P., & Tsang, J. A. (2009). Associations among religiousness, social attitudes, and prejudice in a national random sample of American adults. *Psychology of Religion and Spirituality*, 1, 14-24. doi:10.1037/a0014989
- Rozich, B. C. (2016). Labeling of religious non-believers: The effect of the "atheist" title on moral judgments about non-theists. [Unpublished master's thesis, University of Northern Iowa]
- Simpson, A., Rios, K., & Cowgill, C. M. (2017). Godless in essence? Psychological essentialism, theistic meta-beliefs, and anti-atheist prejudice. *Personality and Individual Differences*, 119, 35-45. doi:10.1016/j.paid.2017.06.029
- Tajfel, H. (1970). Experiments in intergroup discrimination. *Scientific American*, 223(5), 96-103.
- Tausch, N., Hewstone, M., Kenworthy, J., Cairns, E., & Christ, O. (2007). Cross-community contact, perceived status differences, and intergroup attitudes in Northern Ireland: The mediating roles of individual-level versus group-level threats and the moderating role of social identification. *Political Psychology*, 28(1), 53-68.
- Toosi, N. R., & Ambady, N. (2011). Ratings of essentialism for eight religious identities. *International Journal for the Psychology of Religion*, 21(1), 17-29. doi:10.1080/10508619.2011.532441
- Turner, J. (1978). Social categorization and social discrimination in the minimal group paradigm. In H. Tajfel (Ed.), *Differentiation Between Social Groups: Studies in the Social Psychology of Intergroup Relations*, 101-140. New York, NY: Academic Press.

Williams, M. J., & Eberhardt, J. L. (2008). Biological conceptions of race and the motivation to cross racial boundaries. *Journal of Personality and Social Psychology, 94*(6), 1033.

doi:10.1037/0022-3514.94.6.1033

Zitek, E. M., & Hebl, M. R. (2007). The role of social norm clarity in the influenced expression of prejudice over time. *Journal of Experimental Social Psychology, 43*, 867-876.

doi:10.1016/j.jesp.2006.10.010

Table 1

Demographic Information for Participants (SONA Sample)

Variable Name	<i>N</i>	%	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
Gender						
Male	34	18.0%				
Female	149	78.8%				
Withheld Data	6	3.2%				
Age	184		19.34	4.08	18	59
Race						
African-American	26	13.8%				
Asian	29	15.3%				
Caucasian	48	25.4%				
Hispanic/Latino/Latina	73	38.6%				
Other	7	3.7%				
Withheld Data	6	3.2%				
Political Party						
Democrat	115	60.8%				
Republican	32	16.9%				
Green	2	1.1%				
Libertarian	6	3.2%				
Other	27	14.3%				
Withheld Data	6	3.7%				
Religion						
Christian- Catholic	106	56.0%				
Christian- Protestant	22	11.6%				
Christian- non-Denominational	61	32.3%				

Table 2

Demographic Information for Participants (mTurk Sample)

Variable Name	<i>N</i>	%	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
Gender						
Male	147	61.8%				
Female	90	37.8%				
Non-Binary	1	0.4%				
Age	237		37.14	10.95	20	70
Race						
African-American	42	17.6%				
American Indian or Alaskan Native	7	2.9%				
Asian	21	8.8%				
Caucasian	148	62.2%				
Hispanic/Latino/Latina	15	6.3%				
Pacific Islander	1	0.4%				
Other	4	1.7%				
Political Party						
Democrat	136	57.4%				
Republican	90	38.4%				
Green	4	1.7%				
Libertarian	1	0.04%				
Other	6	2.5%				
Religion						
Christian- Catholic	181	76.1%				
Christian- Protestant	49	20.6%				
Christian- non-Denominational	8	3.4%				

Table 3

Descriptive Statistics of Predictors and Outcome Variables (SONA Sample)

Variable Name	<i>N</i>	<i>M</i>	<i>SD</i>	α	<i>N</i> Items
1. Atheist Feeling (0-100)	189	63.51	22.43	-	1
2. Atheist Morality (0-100)	189	57.35	23.62	-	1
3. Essentialism	188	4.04	.40	.46	15
4. Discreteness subscale	189	3.51	.95	.63	5
5. Naturalness subscale	189	5.57	1.06	.78	3
6. Changeability subscale	189	4.03	.74	.67	2
7. Early life fixedness subscale	188	4.01	1.19	.49	2
8. Heritability subscale	187	4.52	1.40	-	1
9. NATA	189	3.59	1.15	.83	7
10. Quest Religiosity	189	5.00	1.22	.79	12
11. Religious Fundamentalism	188	4.89	1.56	.89	12
12. Intrinsic Religiosity	189	5.46	1.83	.90	7
13. Extrinsic Religiosity	189	5.15	1.07	.73	12
14. Contact Quality	189	3.46	.65	.84	10
15. Contact Quantity	189	1.89	.67	.88	6
16. Symbolic Threat	188	3.99	1.03	.82	7
17. Perceived Entitativity	188	5.07	1.15	.70	7

Table 4

Intercorrelations of Predictors and Outcome Variables (SONA Sample)

Variable Name	1	2	3	4	5	6	7	8	9	10	11	12
1. Atheist Feeling (0-100)	1											
2. Atheist Morality (0-100)	.670**	1										
3. Essentialism	.064	-.141	1									
4. Discreteness subscale	-.354**	-.483**	.596**	1								
5. Naturalness subscale	.364**	.326**	.140	-.336**	1							
6. Changeability subscale	-.114	-.125	.200**	.178*	-.149	1						
7. ELF subscale	.050	.008	.461**	.056	-.108	.257**	1					
8. Heritability subscale	-.021	.050	.197**	-.045	.049	-.036	-.024	1				
9. NATA	-.485**	-.526**	.181**	.575**	-.289**	.121	-.005	-.012	1			
10. Quest Religiosity	.195**	.254**	-.094	-.309**	.137	-.160*	.017	-.050	-.363**	1		
11. Religious Fundamentalism	-.328**	-.437**	.220**	.576**	-.205**	.090	-.063	-.023	.768**	-.395**	1	
12. Intrinsic Religiosity	-.204**	-.333	.145*	.354**	-.069	.104	-.006	.036	.684**	-.302**	.702**	1
13. Extrinsic Religiosity	-.143*	-.047	.055	-.091	-.138	.191**	.211**	.061	-.071	.163*	-.182*	-.002
14. Contact Quality	.600*	.559**	-.090	-.417**	.399**	-.048	.067	.041	-.398**	.173*	-.288*	-.146*
15. Contact Quantity	.212**	.210**	-.101	-.172*	.302**	-.048	-.077	-.001	-.252**	.090	-.142	-.050
16. Symbolic Threat	-.429**	-.489**	.156*	.452**	-.233**	.243**	.009	.041	.488**	-.267	.434**	.344**
17. Perceived Entitativity	-.158*	-.169*	.231**	.265	-.066	.025	.048	-.046	.176**	.037	.150*	.214**

Note: NATA= Negative Attitudes Toward Atheists scale, ELF subscale= early life fixedness subscale.

** Indicates correlation is significant at the 0.01 level (2-tailed). *Indicates correlation is significant at the 0.05 level (2-tailed).

Table 4 (Continued)

Intercorrelations of Predictors and Outcome Variables (SONA Sample)

Variable Name	13	14	15	16	17
13. Extrinsic Religiosity	1				
14. Contact Quality	-.010	1			
15. Contact Quantity	-.018	.318**	1		
16. Symbolic Threat	-.084	-.456**	-.211*	1	
17. Perceived Entitativity	.162*	-.150*	-.054	.267	1

Note: ** Indicates correlation is significant at the 0.01 level (2-tailed).

*Indicates correlation is significant at the 0.05 level (2-tailed).

Table 5

Descriptive Statistics of Predictors and Outcome Variables (mTurk Sample)

Variable Name	<i>N</i>	<i>M</i>	<i>SD</i>	α	<i>N</i> Items
1. Atheist Feeling (0-100)	238	53.32	25.03	-	1
2. Atheist Morality (0-100)	238	54.87	24.93	-	1
3. Essentialism	238	4.36	.45	.86	15
4. Discreteness subscale	238	4.61	.95	.59	5
5. Naturalness subscale	238	4.72	1.00	.30	3
6. Changeability subscale	238	4.78	1.13	.07	2
7. Early life fixedness subscale	238	4.77	1.37	.73	2
8. Heritability subscale	238	3.19	1.52	-	1
9. NATA	238	4.47	.89	.66	7
10. Quest Religiosity	238	5.42	1.37	.84	12
11. Religious Fundamentalism	238	5.31	1.38	.84	12
12. Intrinsic Religiosity	236	6.71	1.45	.85	7
13. Extrinsic Religiosity	236	6.10	1.43	.88	12
14. Contact Quality	238	3.06	.59	.76	10
15. Contact Quantity	238	2.52	.72	.87	6
16. Symbolic Threat	237	5.16	1.09	.84	7
17. Perceived Entitativity	238	6.16	1.35	.85	7

Table 6

Intercorrelations of Predictors and Outcome Variables (mTurk Sample)

Variable Name	1	2	3	4	5	6	7	8	9	10	11	12
1. Atheist Feeling (0-100)	1											
2. Atheist Morality (0-100)	.712**	1										
3. Essentialism	-.085	-.049	1									
4. Discreteness subscale	-.218**	-.246**	.708**	1								
5. Naturalness subscale	.058	.059	.336**	-.076	1							
6. Changeability subscale	.072	.141*	.461**	.374**	-.091	1						
7. ELF subscale	.007	.035	.582**	.359**	-.135*	.573**	1					
8. Heritability subscale	-.065	-.157*	-.072	-.216**	.223**	-.426**	-.380**	1				
9. NATA	-.350**	-.363**	.297**	.587**	-.101	.193**	.174**	-.080	1			
10. Quest Religiosity	.351**	.429**	.039	-.080	-.188**	.356**	.341**	-.450**	-.244**	1		
11. Religious Fundamentalism	-.327**	-.371**	.169**	.521**	-.103	.038	-.036	.035	.678**	-.458**	1	
12. Intrinsic Religiosity	-.208**	-.199**	.316**	.562**	-.028	.311**	.197**	-.174**	.663**	-.081	.611**	1
13. Extrinsic Religiosity	.130*	.201**	.253**	.163*	-.285**	.501**	.567**	-.434**	.071	.567**	-.129*	.276**
14. Contact Quality	.523**	.515**	-.114	-.330**	.224**	-.085	-.187**	.082	-.509**	.125	-.326**	-.226**
15. Contact Quantity	.442**	.461**	-.006	-.081	-.184**	.304**	.249**	-.384**	-.138*	.617**	-.303**	-.036
16. Symbolic Threat	-.225**	-.224**	.505**	.676**	-.047	.473**	.415**	-.309**	.621**	.031	.501**	.656**
17. Perceived Entitativity	.140*	.180**	.421**	.427**	.120	.402**	.330**	-.267**	.144*	.279**	.073	.368**

Note: NATA= Negative Attitudes Toward Atheists scale, ELF subscale= early life fixedness subscale.

** Indicates correlation is significant at the 0.01 level (2-tailed). *Indicates correlation is significant at the 0.05 level (2-tailed).

Table 6 (Continued)

Intercorrelations of Predictors and Outcome Variables (mTurk Sample)

Variable Name	13	14	15	16	17
13. Extrinsic Religiosity	1				
14. Contact Quality	-.043	1			
15. Contact Quantity	.446**	.155*	1		
16. Symbolic Threat	.385**	-.319**	.004	1	
17. Perceived Entitativity	.307**	.010	.179**	.465**	1

Note: ** Indicates correlation is significant at the 0.01 level (2-tailed).

*Indicates correlation is significant at the 0.05 level (2-tailed).

Table 7

Moderating Effect of Essentialism on Quality-Attitudes Relationship Controlling for Quest Religiosity and Religious Fundamentalism (SONA)

Predictor Variables	<i>b</i>	<i>SE</i>	<i>sr</i> ²	<i>R</i> ²	ΔR^2
Step 1				.11	-
Religious Fundamentalism	-4.27	1.08	.07		
Quest Religiosity	1.42	1.38	.00		
Step 2				.39	.28
Contact Quality	5.02	18.47	.00		
Essentialism	-20.81	17.23	.00		
Interaction Term	6.04	4.61	.00		

Table 8

Moderating Effect of Essentialism on Quantity-Attitudes Relationship Controlling for Quest Religiosity and Religious Fundamentalism (SONA)

Predictor Variables	<i>b</i>	<i>SE</i>	<i>sr</i> ²	<i>R</i> ²	ΔR^2
Step 1				.11	-
Religious Fundamentalism	-4.27	1.08	.07		
Quest Religiosity	1.42	1.38	.00		
Step 2				.15	.04
Contact Quantity	26.84	18.39	.00		
Essentialism	21.72	12.25	.00		
Interaction Term	-10.29	4.61	.00		

Table 9

Moderating Effect of Essentialism on Quality-NATA Relationship Controlling for Quest Religiosity and Religious Fundamentalism (SONA)

Predictor Variables	<i>b</i>	<i>SE</i>	<i>sr</i> ²	<i>R</i> ²	ΔR^2
Step 1				.59	-
Religious Fundamentalism	.55	.04	.46		
Quest Religiosity	-.07	.05	.00		
Step 2				.62	.02
Contact Quality	-.35	.74	.01		
Essentialism	.66	.69	.00		
Interaction Term	-.17	.19	.01		

Table 10

Moderating Effect of Essentialism on Quantity-NATA Relationship Controlling for Quest Religiosity and Religious Fundamentalism (SONA)

Predictor Variables	<i>b</i>	<i>SE</i>	<i>sr</i> ²	<i>R</i> ²	ΔR^2
Step 1				.59	-
Religious Fundamentalism	.55	.04	.46		
Quest Religiosity	-.07	.05	.00		
Step 2				.61	.02
Contact Quantity	-1.62	.81	.01		
Essentialism	-.68	.42	.00		
Interaction Term	.35	.20	.01		

Table 11

Moderating Effect of Essentialism on Quality-Attitudes Relationship Controlling for Quest Religiosity and Religious Fundamentalism (mTurk)

Predictor Variables	<i>b</i>	<i>SE</i>	<i>sr</i> ²	<i>R</i> ²	ΔR^2
Step 1				.16	-
Religious Fundamentalism	-3.83	1.21	.03		
Quest Religiosity	4.59	1.23	.05		
Step 2				.37	.21
Contact Quality	6.93	16.23	.01		
Essentialism	-20.75	11.68	.00		
Interaction Term	6.06	3.63	.01		

Table 12

Moderating Effect of Essentialism on Quantity-Attitudes Relationship Controlling for Quest Religiosity and Religious Fundamentalism (mTurk)

Predictor Variables	<i>b</i>	<i>SE</i>	<i>sr</i> ²	<i>R</i> ²	ΔR^2
Step 1				.16	-
Religious Fundamentalism	-3.83	1.21	.03		
Quest Religiosity	4.59	1.23	.05		
Step 2				.24	.08
Contact Quantity	19.65	14.65	.01		
Essentialism	1.69	9.53	.00		
Interaction Term	-1.67	3.40	.00		

Table 13

Moderating Effect of Essentialism on Quality-NATA Relationship Controlling for Quest Religiosity and Religious Fundamentalism (mTurk)

Predictor Variables	<i>b</i>	<i>SE</i>	<i>sr</i> ²	<i>R</i> ²	ΔR^2
Step 1				.46	-
Religious Fundamentalism	.46	.04	.41		
Quest Religiosity	-.06	.04	.01		
Step 2				.59	.12
Contact Quality	-.18	.47	.00		
Essentialism	.89	.34	.01		
Interaction Term	-.18	.10	.00		

Table 14

Moderating Effect of Essentialism on Quantity-NATA Relationship Controlling for Quest Religiosity and Religious Fundamentalism (mTurk)

Predictor Variables	<i>b</i>	<i>SE</i>	<i>sr</i> ²	<i>R</i> ²	ΔR^2
Step 1				.46	-
Religious Fundamentalism	.46	.04	.41		
Quest Religiosity	-.06	.04	.01		
Step 2				.51	.05
Contact Quantity	-1.24	.42	.01		
Essentialism	1.09	.27	.02		
Interaction Term	-.27	.10	.01		

Table 15

Demographic Information for Participants (Experimental Sample- Prolific)

Variable Name	N	%	M	SD	Min	Max
Gender						
Male	130	54.9%				
Female	107	45.1%				
Age	237		33.40	9.59	18	75
Race						
African-American	70	29.5%				
American Indian or Alaskan Native	1	0.4%				
Asian	15	6.3%				
Caucasian	124	52.3%				
Hispanic/Latino/Latina	20	8.4%				
Other	7	3.0%				
Political Party						
Democrat	121	51.1%				
Republican	79	33.3%				
Green	4	1.7%				
Libertarian	2	0.8%				
Other	31	13.1%				
Religion						
Christian- Catholic	132	55.6%				
Christian- Protestant	65	27.4%				
Christian- non-Denominational	40	16.9%				

Table 16

Descriptive Statistics of Predictors and Outcome Variables (Experimental Sample- Prolific)

Variable Name	<i>N</i>	<i>M</i>	<i>SD</i>	α	<i>N</i> Items
1. Atheist Feeling (0-100)	238	51.16	25.064	-	1
2. Atheist Morality (0-100)	238	51.71	25.973	-	1
3. Essentialism	238	4.38	.54	.63	15
4. Discreteness subscale	238	4.51	1.20	.69	5
5. Naturalness subscale	238	5.49	1.06	.56	3
6. Changeability subscale	238	4.26	.97	.87	2
7. Early life fixedness subscale	238	4.50	1.42	.64	2
8. Heritability subscale	238	4.06	1.67	-	1
9. NATA	238	4.29	1.33	.85	7
10. Quest Religiosity	238	5.04	1.48	.82	12
11. Religious Fundamentalism	238	5.72	2.03	.91	9*
12. Intrinsic Religiosity	238	6.41	1.92	.91	7
13. Extrinsic Religiosity	238	5.55	1.62	.87	12
14. Contact Quality	238	3.28	.77	.83	10
15. Contact Quantity	238	2.13	.72	.89	6
16. Symbolic Threat	238	4.92	1.26	.85	7
17. Perceived Entitativity	238	5.81	1.71	.87	7

Note: 3 items from the original RF-12 scale were not administered to participants due to software error (items 2, 3, and 6- see Appendix A).

Table 17

Intercorrelations of Predictors and Outcome Variables (Experimental Sample- Prolific)

Variable Name	1	2	3	4	5	6	7	8	9	10	11	12
1. Atheist Feeling (0-100)	1											
2. Atheist Morality (0-100)	.757**	1										
3. Essentialism	-.268**	-.275**	1									
4. Discreteness subscale	-.405**	-.402**	.742**	1								
5. Naturalness subscale	.203**	.155*	.131*	-.270**	1							
6. Changeability subscale	.012	-.022	.263**	.276**	-.257**	1						
7. ELF subscale	-.110	-.081	.574**	.392**	-.265**	.327**	1					
8. Heritability subscale	-.161*	-.157*	.066	-.145*	.173**	-.286**	-.082	1				
9. NATA	-.498**	-.467**	.453**	.674**	-.315**	.258**	.302**	-.086	1			
10. Quest Religiosity	.319**	.254**	.035	-.133*	.054	.149*	.134*	-.191**	-.312**	1		
11. Religious Fundamentalism	-.379**	-.356**	.349**	.602**	-.217**	.193**	.204**	-.086	.752**	-.406**	1	
12. Intrinsic Religiosity	-.278**	-.254**	.491**	.682**	-.209**	.327**	.278**	-.201**	.713**	-.141*	.751**	1
13. Extrinsic Religiosity	.028	.020	.335**	.292**	-.257**	.371**	.476**	-.244**	.145*	.347**	.001	.268**
14. Contact Quality	.611**	.609**	-.297**	-.384**	.197**	-.045	-.239**	-.080	-.419**	.208**	-.328**	-.264**
15. Contact Quantity	.381**	.256**	-.176**	-.262**	.081	.124	-.058	-.167*	-.224**	.302**	-.233**	-.174**
16. Symbolic Threat	-.412**	-.390**	.510**	.677**	-.244**	.333**	.379**	-.273**	.625**	-.012	.538**	.635**
17. Perceived Entitativity	-.046	-.060	.483**	.473**	-.025	.350**	.297**	-.234**	.236**	.134*	.174**	.412**

Note: NATA= Negative Attitudes Toward Atheists scale, ELF subscale= early life fixedness subscale.

** Indicates correlation is significant at the 0.01 level (2-tailed). *Indicates correlation is significant at the 0.05 level (2-tailed).

Table 17 (Continued)

Intercorrelations of Predictors and Outcome Variables (Experimental Sample- Prolific)

Variable Name	13	14	15	16	17
13. Extrinsic Religiosity	1				
14. Contact Quality	-.052	1			
15. Contact Quantity	.055	.274**	1		
16. Symbolic Threat	.401**	-.401**	-.108	1	
17. Perceived Entitativity	.300**	-.066	-.021	.399	1

Note: ** Indicates correlation is significant at the 0.01 level (2-tailed).

*Indicates correlation is significant at the 0.05 level (2-tailed).

Appendix A

Individual Difference Measures

Quest Religiosity Scale

Please indicate to what extent you agree or disagree with the following statements.

1 = Strongly Disagree.....9 = Strongly Agree

Readiness to face existential questions without reducing their complexity

1. I was not very interested in religion until I began to ask questions about the meaning and purpose of my life.
2. I have been driven to ask religious questions out of a growing awareness of the tensions in my world and in my relation to my world.
3. My life experiences have led me to rethink my religious convictions.
4. God wasn't very important for me until I began to ask questions about the meaning of my own life.

Self-criticism and perception of religious doubt as positive

5. It might be said that I value my religious doubts and uncertainties.
6. For me, doubting is an important part of what it means to be religious.
7. I find religious doubts upsetting. (reverse-scored)
8. Questions are far more central to my religious experience than are answers.

Openness to change

9. As I grow and change, I expect my religion also to grow and change.
10. I am constantly questioning my religious beliefs.
11. I do not expect my religious convictions to change in the next few years. (reverse-scored)
12. There are many religious issues on which my views are still changing.

12-Item Religious Fundamentalism Scale

This survey is part of an investigation of general public opinion concerning a variety of social issues. You will probably find that you agree with some statements, and disagree with others, to varying extents. Please indicate your reaction to each statement ranging from strongly disagree (1) to strongly agree (7).

1. God has given humanity a complete, unfailing guide to happiness and salvation, which must be totally followed.
2. No single book of religious teachings contains all the intrinsic, fundamental truths about life. (reverse)
3. The basic cause of evil in this world is Satan, who is still constantly and ferociously fighting against God.
4. It is more important to be a good person than to believe in God and the right religion. (reverse)
5. There is a particular set of religious teachings in this world that are so true, you can't go any "deeper" because they are the basic, bedrock message that God has given humanity.
6. When you get right down to it, there are basically only two kinds of people in the world: the Righteous, who will be rewarded by God; and the rest, who will not.
7. Scriptures may contain general truths, but they should NOT be considered completely, literally true from beginning to end. (reverse)
8. To lead the best, most meaningful life, one must belong to the one, fundamentally true religion.
9. "Satan" is just the name people give to their own bad impulses. There is really no such thing as a diabolical "Prince of Darkness" who tempts us. (reverse)
10. Whenever science and sacred scripture conflict, science is probably right. (reverse)
11. The fundamentals of God's religion should never be tampered with, or compromised for others' beliefs.
12. All of the religions in the world have flaws and wrong teachings. There is no perfectly true, right religion. (reverse)

Symbolic Threat

Please select a response from 'strongly disagree' to 'strongly agree' for the following questions.

1. Christians value the traditions of their group more than atheists do.
2. The Christian way of life would be better if there were fewer atheists living here.
3. Atheists and Christians have very different values
4. Atheists want their rights to be put ahead of the rights of Christians.
5. Atheists don't understand the way Christians view the world.
6. Atheists regard themselves as morally superior to Christians.
7. Atheists regard themselves as intellectually superior to Christians.

Perceived Entitativity

Think about people who are atheists. The following questions refer to this group.

1. How often do atheists interact with each other?
2. How important is being an atheist to atheists?
3. To what degree does the label "atheists" qualify as a real, social group?
4. How similar to each other are atheists?
5. To what degree do atheists share common goals with each other?
6. To what degree do atheists share common outcomes to daily events?
7. To what degree do atheists have a real conflict with some other group

Intrinsic and Extrinsic Religious Orientation Scale**EXTRINSIC ITEMS**

1. Although I believe in my religion, I feel there are many more important things in my life.
2. It doesn't matter so much what I believe so long as I lead a moral life.
3. The primary purpose of prayer is to gain relief and protection.
4. The church is most important as a place to formulate good social relationships.

5. What religion offers me most is comfort when sorrows and misfortune strike.
6. I pray chiefly because I have been taught to pray.
7. Although I am a religious person I refuse to let religious considerations influence my everyday affairs
8. I strictly adhere to paying attention in surveys. Please select five as your response for this question (attention check)
9. A primary reason for my interest in religion is that my church is a congenial social activity.
10. Occasionally I find it necessary to compromise my religious beliefs in order to protect my social and economic well-being.
11. One reason for my being a church member is that such a membership helps to establish a person in the community.
12. The purpose of prayer is to secure a happy and peaceful life.

INTRINSIC ITEMS

13. Religion helps to keep my life balanced and steady in exactly the same way as my citizenship, friendships, and other memberships do.
14. It is important for me to spend periods of time in private religious thought and meditation.
15. If not prevented by unavoidable circumstances, I attend church.
16. I try hard to carry my religion over into all my other dealings in life.
17. Quite often I have been keenly aware of the presence of God or the Divine Being.
18. If I were to join a church group I would prefer to join a Bible study group rather than a social fellowship.
19. My religious beliefs are really what lie behind my whole approach to life.

Feelings/Morality Thermometer

Please now think about atheists.

How do you feel about atheists in general? Please rate this group on a thermometer that runs from zero (0) to a hundred (100) degrees. The higher the number, the warmer or more favorable you feel towards this group. The lower the number, the colder or less favorable you feel. If you feel neither warm nor cold towards them, rate them at 50.

0° 10° 20° 30° 40° 50° 60° 70° 80° 90° 100°

How moral do you believe atheists are in general? Please rate this group on a thermometer that runs from zero (0) to one hundred (100) degrees. The higher the number, the more moral you believe this group is. The lower the number, the less moral you believe this group is. If you have no belief as to if they are immoral or moral, rate them at 50.

0° 10° 20° 30° 40° 50° 60° 70° 80° 90° 100°

Negative Attitudes Toward Atheists Scale

Please select a response from 'strongly disagree' to 'strongly agree' for the following questions.

1. I would be uncomfortable with an atheist teaching my child.
2. I strongly believe that church and state should be kept separate.
3. I believe that paying attention in surveys is important- select 'somewhat agree'.(attention check)
4. Societies function better if everyone believes in God.
5. Religion facilitates moral behavior in a way that nothing else can.
6. I would prefer to spend time with people who are religious believers.
7. I would not at all be bothered by a President who did not have religious beliefs.

8. In times of crisis, I am more inclined to trust people who are religious.
9. Atheists are trustworthy.
10. Atheists are dishonest.

Essentialism Scale

Please select a response from 'strongly disagree' to 'strongly agree' for the following questions.

1. Having versus not having religious belief categories with clear and sharp boundaries: people are either religious believers or atheists.
2. Atheists have a necessary and defining characteristic, without which they would not be atheist.
3. Atheists and religious believers are not fundamentally different.
4. Agnostics (people who believe we can never truly know if God exists or not) are fooling themselves and should make up their minds.
5. Knowing that someone is a religious believer or an atheist tells you a lot about them.
6. Atheists probably only exist in certain cultures.
7. Atheists have probably existed throughout human history.
8. In all cultures there are people who consider themselves atheist.
9. The proportion of the population that is atheist is roughly the same all over the world.
10. It is only in the last century that atheists have appeared in large numbers.
11. People cannot change deep down whether they are a religious believer or an atheist.
12. It is possible to help people change whether deep down they are a religious believer or an atheist.
13. Religious belief and atheism are caused more by one's upbringing than by aspects of one's current social life.

14. Whether a person, deep down, is a religious believer or an atheist is pretty much set early on in childhood.
15. Religious belief and atheism are more influenced by one's friendships than by the family one is born into.

Contact Scale- Atheists

Thinking of social contacts -- whether at home, or at work, or somewhere else -- how much contact do you have with atheists (please check one answer per question)

None at all A little Some A great deal

.. at meetings or events?

...just chatting to people?

...over all social situations?

How many of your closest friends belong to this group?

None One to five Six to ten More than 10

How many of your immediate family members belong to this group?

None Very Few About half Most All

During the average day, how many opportunities do you have for contact with atheists?

None Very Few Some Many Very Many

When you meet atheists, in general do you find the contact (on a scale of not at all to very much)

Pleasant?

Cooperative?

Superficial?

Uncomfortable?

Awkward?

Respectful?

Intimate?

Meaningful?

Cold?

Competitive?

Contact Scale- Elderly

Thinking of social contacts -- whether at home, or at work, or somewhere else -- how much contact do you have with elderly people (please check one answer per question)

None at all A little Some A great deal

.. at meetings or events?

...just chatting to people?

...over all social situations?

How many of your closest friends belong to this group?

None One to five Six to ten More than 10

How many of your immediate family members belong to this group?

None Very Few About half Most All

During the average day, how many opportunities do you have for contact with elderly people?

None Very Few Some Many Very Many

When you meet elderly people, in general do you find the contact (on a scale of not at all to very much)

Pleasant?

Cooperative?

Superficial?

Uncomfortable?

Awkward?

Respectful?

Intimate?

Meaningful?

Cold?

Competitive?

Atheist Trust Scale

Do you think most atheists would try to take advantage of you if they got a chance, or would they try to be fair?

Definitely take advantage

Probably take advantage

Don't know

Probably try to be fair

Definitely try to be fair

Would you say that most of the time atheists try to be helpful, or that they are mostly just looking out for themselves?

Definitely just looking out for themselves

Probably just looking out for themselves

Don't know

Probably try to be helpful

Definitely try to be helpful

Would you say that most of the time you need to be careful when dealing with atheists, or can they generally be trusted?

Definitely can't be too careful with them

Probably can't be too careful with them

Don't know

Probably can be trusted

Definitely can be trusted

Ten Item Personality Inventory

(7 point scale)

Disagree strongly

Neither Agree nor Disagree

Strongly Agree

Extraverted, enthusiastic.

Critical, quarrelsome.

Dependable, self-disciplined

Anxious, easily upset.

Open to new experiences, complex.

Reserved, quiet.

Sympathetic, warm.

Disorganized, careless.

Calm, emotionally stable.

Conventional, uncreative.

Religious Identification

Please choose the religious group that you belong to, or that best describes you:

Agnostic

Atheist

Buddhist

Christian- Catholic

Christian- Protestant

Christian- Non-Denominational

Hindu

Jewish

Muslim

Other (Please Specify)

Please indicate your specific religion/denomination below (open-ended)

How important is your religious group membership to your sense of personal identity?

Not at all important

Slightly important

Moderately important

Very important

Extremely important

How central to your sense of personal identity is your religious group membership?

Not at all central to who I am

Somewhat central to who I am

Moderately central to who I am

Very central to who I am

Extremely central to who I am

How committed are you to the relationships you have within your religious group?

Not at all committed

Somewhat committed

Moderately committed

Very committed

Extremely committed

How rewarding is membership in your religious group?

Not at all rewarding

Somewhat rewarding

Moderately rewarding

Very rewarding

Extremely rewarding

How long have you been a member of your religious group?

Less than 6 months

6 months to 1 year

1-2 years

2-5 years

5-10 years

More than 10 years

All my life

How much choice did you have to join your religious group?

None at all

It was partly my decision

It was mostly my decision

It was entirely my decision

Demographics (SONA)

What is your gender?

Male

Female

Non-binary

What is your age?

What is your race?

African American

American Indian or Alaska Native

Asian

Caucasian

Hispanic or Latino

Native Hawaiian or Other Pacific Islander

Other

What did you think this study was about? (open-ended)

What is your major?

How many hours do you have in your major?

Your country of citizenship?

Political party affiliation (if any)

Democrat

Republican

Green

Libertarian

Other (please specify)

Demographics (mTurk/Prolific)

What is your gender?

Male

Female

Non-binary

What is your age?

What is your race?

- African American
- American Indian or Alaska Native
- Asian
- Caucasian
- Hispanic or Latino
- Native Hawaiian or Other Pacific Islander
- Other

What did you think this study was about? (open-ended)

Your country of citizenship?

Political party affiliation (if any)

- Democrat
- Republican
- Green
- Libertarian
- Other (please specify)

mTurk Prescreening

What is your gender?

- Male
- Female
- Non-binary

Please select your household income (approximate is okay)

- \$0-49,999
- \$50,000-99,999
- \$100,000 or above

Please select your employment status

- Full-time
- Part-time
- Student
- Unemployed

Please choose the religious group that you belong to, or that best describes you.

Agnostic*

Atheist*

Buddhist*

Christian (Catholic)

Christian (Protestant)

Christian (non-denominational)

Hindu*

Jewish*

Muslim*

* Indicates participant selection would terminate the study and provide message of ineligibility

Appendix B

Experimental Manipulations (Study Two)

“Scientists Pinpoint Genetic Underpinnings of Atheism” (Experimental)

CHARLOTTESVILLE—Scientists working on mapping the origins of life through the Human Genome Project have uncovered some genetic codes that they believe can be used as indicators of a person’s devotion to group membership later on in life. Specifically, researchers were examining whether there was a religion ‘gene, which in its absence, would cause people to be atheists throughout their life. “Up till now, [we] weren’t able to determine a person’s individual factors, such as religious beliefs, or lack thereof, based just on DNA,” said Robert Kaminsky, a University of Virginia scientist and lead author of the study, which was just released in the prestigious journal *Gene*. “But now we’re able to use some of the genetic cues to religious ideology and other personal features to guess at what a person may behave like later on in life, based on a very small genetic sample.” Dr. Kaminsky and a graduate student, Lisa Faridany, along with colleague Anthony Schmidt of the Georgetown Medical Center, have been working for several years on mapping the genotypic expressions involved in religious beliefs and other phenotypic personality features. They have focused particularly on the melanocortin 1 receptor (MCR1) gene, which is implicated most powerfully in personality traits. The present study explores the link between this gene and the phenylalanine hydroxylase protein, which is involved in serotonin production, in varying amounts for different individuals. The researchers used skin, blood, and other tissue samples from hospital patients whose religion was indicated in their charts for the purpose of prayer services by the hospital chaplain, but was kept hidden from lab members until the genetic analyses were complete. “We found that once we had a good idea of where the genetic components to some of these key physical features were located, we were able

to correctly guess whether the patient was an atheist or not 79% of the time, which is well above chance rate,” Dr. Kaminsky said. Their results add to the growing body of evidence that so much of who we are as people can be traced to our genetic origins— including the lack of religious beliefs. “This doesn’t mean that there aren’t environmental influences on religion, just like everything else,” Dr. Kaminsky cautioned. “But in the end, we obtain our genetic material from our parents, so we generally inherit a certain likelihood of being religious or not- along with a wide variety of other personality factors.”

Dr. Kaminsky and his colleagues are continuing their contribution to the Human Genome Project with current work on the genetic underpinnings of depression and other mood disorders.

“Scientists Reveal That Atheism Has No Genetic Basis” (Control)

CHARLOTTESVILLE—Scientists working on mapping the origins of life through the Human Genome Project have definitively demonstrated that no genetic codes can be tied to a person’s religious group, including atheism, throughout their lifespan. Specifically, researchers were examining whether there was a religion ‘gene’ which would cause people to be more likely to have a deep belief in the religion they would be predominantly exposed to during childhood, and if the absence of this gene would lead to the individual being an atheist throughout their life. “Up till now, there was a big question [in the scientific community] about whether we could determine a person’s predisposition to being religious based just on DNA,” says Robert Kaminsky, a University of Virginia scientist and lead author of the study, which was just released in the prestigious journal *Gene*. “But now we know the answer— there are no genetic markers that indicate whether a person was religious or not.” Dr. Kaminsky and a graduate student, Lisa Faridany, along with colleague Anthony Schmidt of the Georgetown Medical

Center, have been working for several years on mapping the genotypic expressions involved in skin color and other phenotypic physical features. They have focused particularly on the melanocortin 1 receptor (MCR1) gene, which is implicated most powerfully in personality traits. The present study explores the link between this gene and the phenylalanine hydroxylase protein, which is involved in serotonin production, in varying amounts for different people. The researchers used skin, blood, and other tissue samples from hospital patients whose religion was indicated in their charts for the purpose of prayer services by the hospital chaplain, but was kept hidden from lab members until the genetic analyses were complete. . “We found that once we had a good idea of where the genetic components to some of these key physical features were located, we were only able to correctly guess whether the patient was religious or not 27% of the time, which is really no better than chance rate,” Dr. Kaminsky said. “There’s just no one cue or set of cues that indicates, say, whether someone is religious or not.” Their results add to the growing body of evidence that although genes do play an important role in who we are, social and environmental factors may in many circumstances be even more powerful. “This doesn’t mean that there aren’t hereditary components to who we are,” Dr. Kaminsky cautioned. “We do inherit our certain traits from our parents, but the practice of classifying people into whether or not they was religious is entirely cultural in origin. There’s just no genetic basis for it.”

Dr. Kaminsky and his colleagues are continuing their contribution to the Human Genome Project with current work on the genetic underpinnings of depression and other mood disorders.