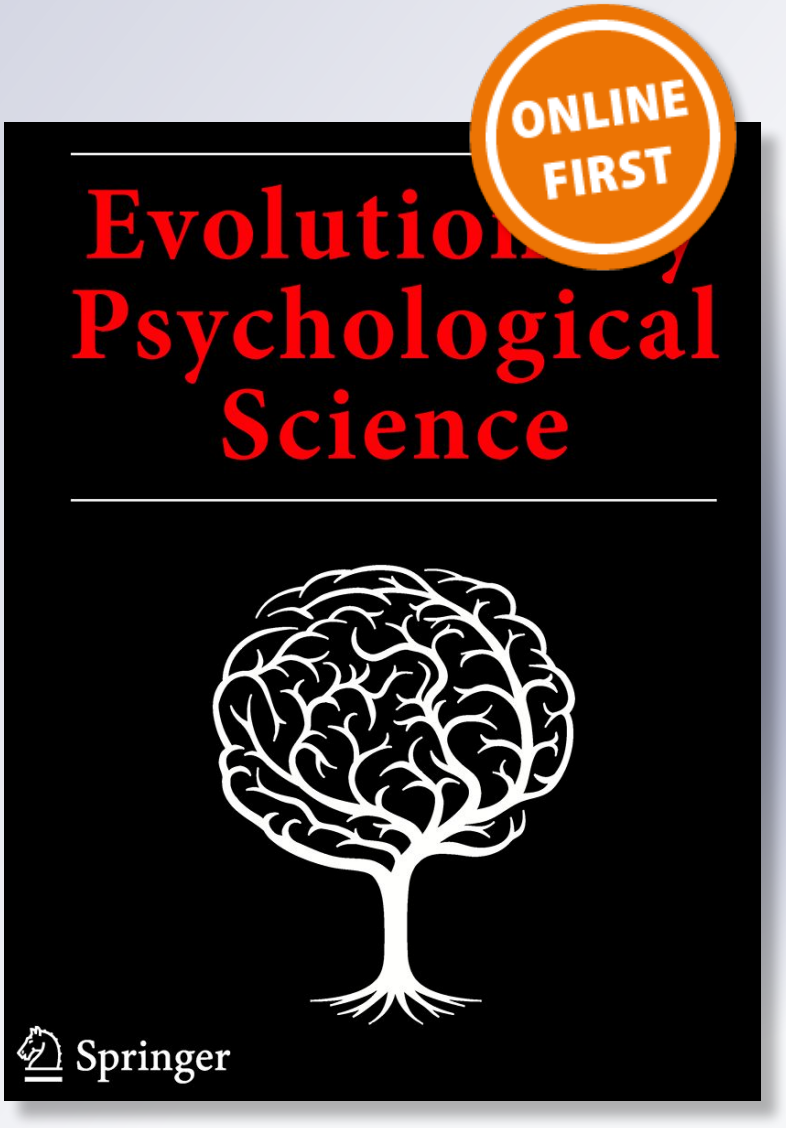
Religious Devotion and Extrinsic Religiosity Affect In-group Altruism and Out-group Hostility Oppositely in Rural Jamaica

R. Lynch, B.G Palestis & R. Trivers

Evolutionary Psychological Science

e-ISSN 2198-9885

Evolutionary Psychological Science
DOI 10.1007/s40806-017-0103-y



Springer

Evolutionary Psychological Science
DOI 10.1007/s40806-017-0103-y

RESEARCH ARTICLE

Religious Devotion and Extrinsic Religiosity Affect In-group Altruism and Out-group Hostility Oppositely in Rural Jamaica

R. Lynch[1] · **B.G Palestis**[2] · **R. Trivers**[3]

Abstract It has been suggested that intergroup conflict has played an important role in the evolution of human cooperation—aggression against out-groups and cooperation with in-groups may be linked in humans. Previous research suggests that religion may help to facilitate this effect, such that those who view religion as a way to achieve non-religious goals (e.g., raise their status) and regularly attend religious services are more likely to hold hostile attitudes towards out-groups, but that measures of religious devotion (e.g., belief in God) are either unrelated or negatively associated with measures of prejudice. Using questionnaires of key variables on a well-studied rural Jamaican population, we analyzed how different aspects of religious belief predict hostility towards other religions and loyalty to one's own. In support of previous research, our results indicate that hostility towards other religions is positively predicted by extrinsic religiosity (i.e., using religion to achieve non-religious goals: Allport 1954) and attendance at religious services but is negatively predicted by devotion to religious principles. Meanwhile, willingness to sacrifice for one's own beliefs is positively predicted by religious devotion. These results support the hypothesis that while devotion to religious principles can increase in-group cooperation, the social aspects of religion can generate hostile attitudes towards out-groups.

Keywords Extrinsic religious beliefs · Intrinsic religious beliefs · In-groups · Out-groups · Parochial altruism

Introduction

The willingness shown by some humans to sacrifice for their own group at a cost to themselves combined with hostility towards other groups has previously been called "parochial altruism" (Bernhard et al. 2006). This phenomenon may help explain why group boundaries are so powerful in humans (Choi and Bowles 2007). Bowles (2008) has argued that attitudes towards in- and out-groups evolve in conjunction and may depend on the frequency of conflict between groups. Choi and Bowles (2007) ran simulations to better understand the evolution of parochial altruism. The authors found two conditions under which groups were most successful: (1) when the frequency of warfare is low, groups thrive when they are comprised of individuals who are tolerant [of other groups] and selfish [within their own groups]; or (2) when the frequency of warfare is high, groups with hostile individuals [towards other groups] and altruistic ones [within their own group] are more likely to succeed. Interestingly, across all the simulations, altruism and tolerance never developed independently; the traits consistently co-evolved and their success depended upon the frequency of lethal conflict between groups (Choi and Bowles 2007).

The role that religion plays in generating in-group altruism and out-group hostility is of particular interest to researchers because religions have the power to redraw boundaries between groups, create group identity, and promote prejudice

Electronic supplementary material The online version of this article (doi:10.1007/s40806-017-0103-y) contains supplementary material, which is available to authorized users.

✉ R. Lynch
lynchrf@missouri.edu

[1] University of Missouri, 220 Swallow Hall, Columbia, MO 65211, USA

[2] Wagner College, One Campus Road, Megerle Science Building 413, Staten Island, NY 10301, USA

[3] Rutgers University, Ruth Adams Building, 131 George Street, New Brunswick, NJ 08901-1414, USA

Published online: 08 May 2017

(Allport 1954; Bloom 2012). Several studies have suggested that an important function of religion is to bind individuals and groups together (Atran 2003; Atran and Norenzayan 2004; Boyer 2001). In support of this argument, members of religious groups often privilege individuals who share their faith, background, and culture (Dawkins 2006; Hall et al. 2010; Harris 2004; Bloom 2012). Moreover, religions often have rules that help to solidify and promote the defense of social groups (Atran 2010; Ysseldyk et al. 2010; Welch et al. 2007; Irons 1996, 2001) while simultaneously propagating fear and hatred of out-groups (Graham and Haidt 2010; West 1941).

Although it is clear that religion has an important impact on the formation of barriers between groups, researchers have had trouble distinguishing the effects of the beliefs themselves from the social effects that result from belonging to a group. For instance, belief in an all-powerful moralizing god has been positively associated with cooperative altruism (Johnson 2005; Henrich 2011) and a willingness to punish non-cooperators (McKay et al. 2011) and can increase generosity towards unknown and distant individuals who are in the same religion (Purzycki et al. 2016). At the same time, religious participation has also been shown to promote in-group cooperation (Henrich et al. 2010; Norenzayan and Shariff 2008) and an escalation of intergroup conflict (Ginges et al. 2007).

Such social effects, however, may be distinct from the particular beliefs that underlie the religion. For example, some studies have shown that although an individual's religious beliefs can affect which political positions people support (e.g., on abortion) (Liddle et al. 2010, Dawkins 2006), attendance at church is the key factor predicting how often people volunteer or contribute to charities (Putnam and Campbell 2010). In other words, group membership may be enough to produce a particular behavior and the religious beliefs themselves may be irrelevant (Brooks 2006).

Nevertheless, even if the specific content of a belief does not always predict attitudes or behaviors, the fact that one "truly" believes may be important. For example, if the evolution of religious belief depends on adaptations that enhance the ability to detect free riders and if signals of group membership are cheaper for true believers than they are for less committed fakers, then cooperation can evolve and religious belief can be adaptive (Haidt 2012; Richerson et al. 2014). Evidence showing that religious communes are more stable and survive longer than secular communes lends support to this view (Sosis 2000). Studies have also found positive correlations between costly rituals (e.g., constraints placed on sex or types of food consumed) and the longevity of religious communes in the USA (Sosis and Bressler 2003) and behaviors that exhibit in-group identity (e.g., ritual genital mutilation, body piercings) and intergroup warfare (Sosis et al. 2007).

Because it can be difficult to distinguish between the signals of religious belief and what individuals actually believe, researchers have sought to differentiate between the social benefits gained by belonging to a group and those obtained by real conviction to particular beliefs (Allport and Ross 1967; Ginges et al. 2009, 2016; Hall et al. 2010). Allport and Ross (1967) separated religious belief into what they call "extrinsic religiosity" and "intrinsic religiosity." Extrinsic beliefs are presumed to be held by individuals who have a pragmatic approach to religion, are motivated by external desires (e.g., social status, acceptance from others, and security), and view religion as a way to achieve these goals. Meanwhile, intrinsic beliefs are characterized by true conviction and are presumed to be held by individuals who view religion as an end in itself. Separating religious belief into these two categories has revealed a positive association between ethnic prejudice and extrinsic, but not intrinsic, religiosity (Allport and Ross 1967). Many studies have bolstered these results suggesting a positive association between racial prejudice and extrinsic religious orientation (Whitley and Kite 2010; Herek 1987) but many of these studies have concluded that the target of discrimination is important. An extrinsic orientation predicts intolerance for homosexuals and for different races (Hunsberger and Jackson 2005), whereas intrinsic religious orientation has also been positively associated with prejudiced attitudes against homosexuals but has rarely been positively associated with racial bigotry (Whitley and Kite, 2010). The relationship between religious orientation and prejudice is also complicated by motivation and social desirability, where some people behave in discriminatory ways but make efforts to appear unprejudiced (Batson 1982). A meta-analysis of 55 studies between 1964 and 2008 confirmed the complexity of these results but also showed that religious humanitarianism is largely expressed to in-group members (Hall et al. 2010).

Religion has been used to justify behaviors ranging from violent acts spawned by hate to altruistic acts built on compassion. Therefore, the role that religious beliefs play in producing violence and exacerbating conflict has generated intense debate (Cavanaugh 2009; Dawkins 2006; Harris 2004; Juergensmeyer 2003). A recent study addressed this issue directly and showed that the frequency of attendance at religious services, but not "religious devotion" as indicated by frequency of prayer [to God] or any other measure of certain belief in an omnipotent and moral God, positively predicted support for suicide bombers and overall religious sectarianism (out-group hostility and in-group altruism) (Ginges et al. 2009). The authors of this study argue that attendance at religious ceremonies enhances commitment to coalitional identities. In other words, it is not the religious beliefs themselves that increase in-group cooperation and hostility towards out-groups, but rather the ability of religion to bring individuals together and foster group identity through collective rituals. Another study showed that when Palestinian Muslims were asked to think from the perspective of Allah, they showed a marked reduction in their biased valuation of Palestinian over Jewish lives (Ginges et al. 2016). These results are consistent

with the view that an important function of religion is not only to help solidify in-groups and unite communities, but also that some religious beliefs (e.g., belief in God) may actually reduce hostility towards out-groups.

Our study builds on these results by examining the influence that religious devotion and beliefs have in promoting either compassion or hatred towards others. Specifically, we examined the impact that intrinsic or extrinsic religious belief, prayer, attendance at religious services, and overall religious devotion has on in-group altruism and hostility towards out-groups. Based on previous work and theory, we made the following three predictions:

(P1) Intrinsic religious beliefs and religious devotion will positively predict in-group altruism (Welch et al. 2007; Brooks 2006) and negatively predict out-group hostility (Ginges et al. 2016), thereby tending to increase overall altruism and tolerance towards others both within and between groups;

(P2) Extrinsic religious beliefs (Allport and Ross 1967; Hall et al. 2010) and attendance at religious services (Ginges et al. 2009) will predict in-group altruism and out-group hostility;

(P3) In-group altruism will be positively correlated with out-group hostility (Choi and Bowles 2007).

Methods

The Study Population

This research was part of a long-term study in Jamaica, started in 1996, on bilateral symmetry and 2ND:4TH digit ratios in humans. The study population is comprised of 288 individuals (155 males, 131 females, and 2 of unknown gender) drawn from Southfield in the parish of St. Elizabeth. This is a rural part of Jamaica located on the southwest coast and is several hours drive from the closest major city and airport in Montego Bay. Individuals were recruited from three schools in the area, and when the study began, were 5–11 years old (mean age = 8.18 ± 1.73). Almost all of the individuals measured were from a single school called Top Hill primary school (242 out of a total of 258 were measured in the original study). The area is also known for low levels of out-migration. This study population is described in detail in Trivers ((1999). This study was conducted in 2010 and 163 individuals (99 males and 64 females) from the original population that returned for this study. Informed consent was obtained in writing from all participants and was approved by the Rutgers University Office of Research and Sponsored programs on February 18, 2010 (Protocol# 10-378M).

The population is useful for studying in-group biases because all individuals from this study are close in age (within 6 years of each other), share similar socioeconomic and educational backgrounds, and are all from the same mixed race and culture. Almost all of the individuals who showed up for this study still live in or near the area where they all attended primary school together. Therefore, many of the group distinctions (e.g., race, class, and age) that have complicated efforts to interpret results from other study populations are minimized. According to the most recent census, approximately 62% of the Jamaican population reports being Christian (International Religious Freedom Report 2008), and the study population showed similar results (63% reported being Christian). According to a 2009 Gallup Poll, approximately 70% of Jamaicans answered yes to the question "Is religion an important part of your daily life?" which is similar to the 69% reported in the USA (Gallup Poll Religion 2008).

Predictor Variables

Surveys

To deal with any literacy problems, all individuals were provided with the opportunity to either read the questions on a sheet of paper and/or have them presented orally by a Jamaican graduate student researcher.

Religious Beliefs and Devotion

Questionnaires taken from different religious subscales were used to assess each of the following: "extrinsic religious belief," "intrinsic religious belief," and religious devotion.

Intrinsic religious belief was measured as the mean of responses to a 9-question survey (Allport and Ross 1967), scored on a 7-point Likert scale (1 = not at all true to 7 = very true). Examples of these questions are "I try hard to carry my religion over into all my other dealings in life" and "My religious beliefs are really what lie behind my whole approach to life" (see Allport and Ross 1967 for all nine questions). This questionnaire is presumed to measure the extent to which an individual sincerely believes in and practices their religion and the extent to which they have internalized their religious beliefs. Individuals who score high on an intrinsic religious belief questionnaire are seen to view religion as an end in itself, as an active force guiding and providing meaning and purpose to their lives (Whitely and Kite, 2010 2010; Batson 1982). The nine items were analyzed for internal consistency and formed a reasonable index (Cronbach's $\alpha = 0.61$).

Extrinsic religious belief was assessed by calculating the mean response to an 11-question survey (Allport and Ross 1967). The questions were scored on a 7-point Likert scale (1 = not at all true to 7 = very true). Some examples of these questions are "What religion offers me most is comfort when

sorrows and misfortune strike" and "Occasionally I find it necessary to compromise my religious beliefs in order to protect my social and economic well-being" (see Allport and Ross 1967 for all 11 questions). The extrinsic belief questions are purported to assess the degree to which one uses religion to achieve non-religious goals. People who score high in extrinsic religiosity are expected to be more likely to use religion as a means to an end and to use religion to rationalize their behavior and actions (Whitley and Kite 2010). The 11 items scored formed a reasonable index (Cronbach's $\alpha = 0.73$).

Religious devotion was measured by agreement (1) or disagreement (0) with statements that were designed to assess the effect of religious devotion and were taken directly from a Ginges et al. (2009) paper on support for suicide bombers: Examples include "I have always believed in God" and "God judges my actions and the way I live my life" (see Ginges et al. 2009 for all nine questions). These items formed a lower index (Cronbach's $\alpha = 0.56$). Internal consistency may have been relatively low on these surveys because of literacy problems in Jamaica. In a sample of Palestinians, this same set of questions yielded a Cronbach's $\alpha = 0.67$ ($N = 4704$) (Ginges et al. 2009).

Prayer and Attendance at Religious Services

To assess prayer frequency, we used responses to the question: "How often do you pray?" (see Ginges et al. 2009). Responses were as follows: 0 = never (1%); 1 = very little; 2 = Sundays and holidays (3%); 3 = more than once a week (20%); 4 = every day (50%); 5 = more than once a day (12%). To assess attendance at religious services, we used responses to the question: "Do you agree with the statement: I regularly attend an organized religious service" (Ginges et al. 2009). Responses were 0 = disagree (67%) and 1 = agree (33%).

Control Variables

Additional questions on religious practices were asked that were tailored specifically for the study population: (1) "Are you a Christian?" yes = 63%, no = 37%; (2) "Have you been baptized?" no = 75%, yes = 25%; and (3) "Are you a member of a church?" no = 30%, yes = 70%.

Dependent Variables

The three dependent variables used were taken directly from the work of Ginges et al. (2009): (1) in-group altruism, (2) out-group hostility, and (3) tolerant altruism. "I would be willing to die for my God/beliefs" was used to assess in-group altruism and responses were 1 = agree (89%) and 0 = disagree (11%). "I blame people of other religions for much of the trouble in the world" was used to determine out-group hostility and responses were 1 = agree (49%) and 0 = disagree (51%). These two variables were also combined to create a third variable assessing both an individual's willingness to sacrifice for their own group and their tolerance for other religious groups which we called "tolerant altruism." If individuals were both "willing to die for their beliefs" and did *not* "blame people of other religions," they received a "1" (45%); otherwise they received a "0" (55%).

Model Selection

There are numerous variables that have been generated by the Jamaican symmetry project over the years and there were several studies conducted simultaneously in 2010 when these data were collected. Therefore, for this study, we selected only the variables (listed above) that we collected in 2010 and those that were directly related to our hypotheses. Our main goal was to replicate the Ginges et al. (2009) paper on parochial altruism and support for suicide bombers in a new population, so we used all of the measures used in that paper. We also introduced the measures of intrinsic and extrinsic religious belief to further tease apart different aspects of religiosity with questionnaires developed by Allport and Ross (1967) that had been in use for decades. Finally, three additional questions that we believed were specifically relevant to this population were also included. Christianity was used because, although this population is predominantly Christian, some individuals in this area also identify as Rastafarian. Whether an individual had been baptized and whether one had become a church member were included to identify commitment to their religion, while sex was entered as a covariate to examine whether any sex differences may affect the outcome variables.

Next, we used candidate sets of all the combinations of all of the explanatory variables described above to model each of the three dependent variables in a generalized linear model logistic regression in R Studio 3.2.2. Multicollinearity among variables in a model can artificially inflate the standard errors of parameter estimates, so we prevented any variables with correlation (Pearson's $r > |0.5|$) from being entered into the same model. There were two independent variables that were correlated by more than |0.5|: "Are you a Christian?" and "Were you baptized?" ($r = 0.65$, $p < 0.001$, $N = 161$), so these variables were prevented from appearing in the same model simultaneously. We fitted models with the package "lme4" and used the "MuMIn" package to fit all possible combinations of the predictor variables. We then ranked models by Akaike's Information Criterion (AIC) Score and used all the variables within two AICc units of the top-ranked model. These variables were considered to be "informative" as they were seen to be most useful in striking a balance between model complexity and overfitting our sample to the model (AICc; Burnham and Anderson 2002).

We evaluated model performance by calculating the area under the curve (AUC) of the receiver operating characteristic

(ROC) for each of the top models (Fielding and Bell 1997). The AUC evaluates a model's performance by indicating how well the model predicts a subject's response to the dependent variable. An AUC value of 1.0 indicates perfect predictability, and a value of 0.5 indicates the model's predictability is equal to random. We considered values with 95% confidence intervals (CIs) that did not overlap with 0.5 to be reasonable models (Boyce et al. 2002).

Results

In-group Altruism

Variables were considered informative if they were used in models that were within two AICc points of the top model (see "Model selection"; AIC tables are given in the Supplementary Material). Eight variables met this criterion for predicting in-group altruism: "religious devotion," "extrinsic religious belief," "intrinsic religious belief," "attendance," "sex," "Are you a Christian?," "church member," and "frequency of prayer." The only variable that had an odds ratio that did not overlap with 1.0 (95% CI) was religious devotion (Table 1, supplementary materials Table S3 and Fig. 1) (P1). If we just use the top model (model with the lowest AIC score), then only religious devotion remains in the model and the odds ratio for religious devotion improves substantially (odds ratio = 1.86, 95% CI (1.24–2.8), $p = 0.002$) (P1) (see supplementary material Table S3). The AUC value for the top model was 0.683 (95% CI (0.54–0.83)), indicating that the model performs significantly better than chance.

Out-group Hostility

Informative variables retained in the top models predicting out-group hostility were "religious devotion," "extrinsic religious belief," "attendance," "intrinsic religious belief," "Are you a Christian?," and "church member" (see Table 2, supplementary materials Table S4). The only variables that had an odds ratio that did not overlap with 1.0 (95% CI) were attendance (P2), extrinsic religious belief (see Table 2 and Fig. 1) (P2), and religious devotion (odds ratio = 0.70 (95% CI (0.50–0.99) (P1). If we use only the top model, all the same variables remain in the model. The AUC value for the top model was 0.698 (95% CI (0.62–0.78)), indicating that the model performs significantly better than chance.

It is worth noting, however, that our measures of religious devotion and intrinsic religiosity were positively correlated ($r = 0.371$) and that entering either one into the model without including the other increases its effect. Nevertheless, we retained both of these variables in the models despite this modest collinearity based on our model selection criteria (lowest AIC scores) and therefore consider our results to be conservative. The main influence that both of these seem to have on positively affecting in-group altruism and a negative impact on out-group hostility is retained regardless of whether both or either variable is entered independently. Our measures of extrinsic and extrinsic religiosity were also correlated ($r = 0.38$); so, we entered each separately for each of our analyses to check for collinearity. For in-group altruism, excluding extrinsic religiosity from the model increases the significance of intrinsic religiosity and the mean odds ratios increases slightly from 1.35 to 1.38, and its exclusion has no discernible impact on religious devotion. Meanwhile, excluding intrinsic religiosity from the model predicting out-group hostility yields not only a slightly lower mean odds ratio for extrinsic religiosity (1.35) but also a lower mean odds ratio for religious devotion (0.63). Therefore, we consider our results to be robust to collinearity and view including all the variables selected across models to be both consistent and conservative.

Tolerant Altruism (In-group Altruism and Tolerance for Out-groups Combined)

Informative variables that were retained in the top models predicting overall in-group altruism and tolerance of other groups (i.e., willingness to die for one's beliefs combined with tolerance for people of other religions—see "Methods") which we called "tolerant altruism" were "religious devotion," "extrinsic religious belief," "attendance ," "frequency of prayer," "intrinsic religious belief," "Are you a Christian?," and "church member" (see Table 3, supplementary materials Table S5 and Fig. 1) (P1–P2). The only variables that had an odds ratio that did not overlap with 1.0 (95% CI) were religious devotion, are you a church member, and extrinsic religious belief (see Table 3 and Fig. 1) (P2). Attendance approached significance (P2). If we only use the top model, then religious devotion (odds ratio = 1.54 (95% CI (1.08–2.21), $p = 0.019$); attendance (odds ratio = 0.50 (95% CI

Table 1 Modeling in-group altruism with all covariates in top models (AICc score within 2 points of top model)

	Wald (p value)	Odds ratio (95% CI)
Religious devotion	3.84 (0.04)*	1.64 (1.06–2.71)
Extrinsic religious belief	0.25 (0.62)	1.15 (0.67–1.96)
Attendance	0.48 (0.49)	1.52 (0.47–4.97)
Intrinsic religious belief	0.81 (0.37)	1.35 (0.71–2.56)
Sex	1.29 (0.26)	0.52 (0.17–1.62)
Church member	0.47 (0.49)	1.60 (0.42–6.13)
Are you a Christian?	0.90 (0.34)	0.55 (0.16–1.90)
Prayer	0.33 (0.57)	1.14 (0.73–1.77)

*$p < 0.05$

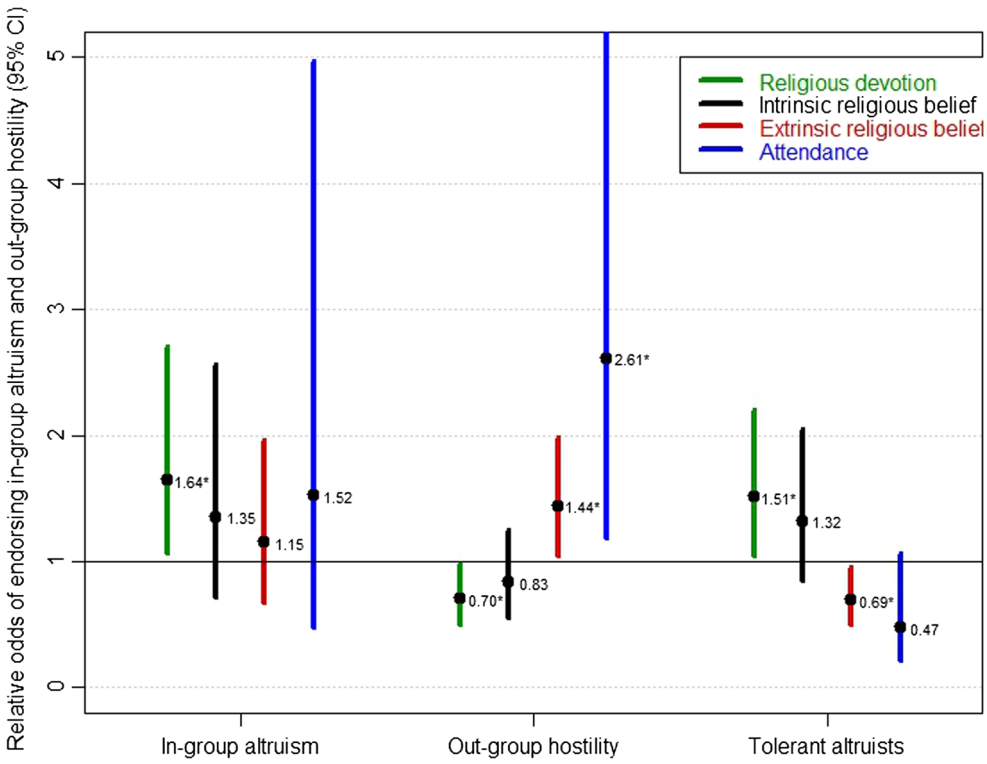


Fig. 1 95% CI around odds ratios for each of the key variables in Tables 1, 2, and 3. Statistical significance is indicated by an *asterisk*. *X*-axis variables are in-group altruism, out-group hostility, and tolerant altruists. "Tolerant altruists" refers to a combination of in-group altruism and lack of out-group hate

(0.22–1.10), $p = 0.086$); extrinsic religious belief (odds ratio = 0.73 (95% CI (0.54–0.99), $p = 0.042$); and church member (odds ratio = 2.5 (95% CI (1.07–5.80), $p = 0.034$) remain. The AUC value for the top model was 0.70 (95% CI (0.62–0.78)), indicating that the model performs significantly better than chance.

The two autonomous dependent variables "I would be willing to die for my God/beliefs" and "I blame people of other religions for much of the trouble in the world" were not significantly correlated ($r = 0.072$, $p = 0.362$, $N = 163$) (P3). Most (89%) subjects fell into one of two categories: (1) they were willing to die for their beliefs and blamed other religions (45%), or (2) they were willing to die for their beliefs and did not blame other religions (44%) (Table 4).

Table 2 Modeling out-group hostility with all covariates in top models (AICc score within 2 points of top model)

	Wald (*p* value)	Odds ratio (95% CI)
Extrinsic religious belief	4.90 (0.03)*	1.44 (1.04–1.98)
Attendance	5.66 (0.02)*	2.61 (1.18–5.75)
Church member	2.73 (0.10)	0.49 (0.21–1.14)
Religious devotion	4.01 (0.04)*	0.70 (0.50–0.99)
Are you a Christian?	2.29 (0.13)	1.80 (0.84–3.86)
Intrinsic religious belief	0.77 (0.38)	0.83 (0.55–1.25)

*$p < 0.05$

Discussion

Overall, these findings suggest that the beliefs and the social aspects that underlie religion have distinct effects on attitudes within and between groups. We found that religious beliefs themselves are positively associated with a willingness to sacrifice for one's beliefs and a greater tolerance of out-groups, while the social facets of religion, such as attendance, promote greater hostility towards out-groups. These results provide support for previous studies indicating that religious devotion is positively associated with prosocial behaviors towards in-groups (Welch et al. 2007; Brooks 2006) and negatively

Table 3 Modeling "tolerant altruism" (in-group altruism combined with tolerance for out-groups) with all covariates in top models (AICc score within 2 points of top model)

	Wald (*p* value)	Odds ratio (95% CI)
Extrinsic religious belief	4.80 (0.03)*	0.69 (0.50–0.96)
Religious devotion	4.6 (0.03)*	1.51 (1.04–2.20)
Attendance	3.33 (0.07)	0.47 (0.21–1.06)
Church member	4.26 (0.04)*	2.57 (1.05–6.28)
Prayer	0.05 (0.83)	0.97 (0.73–1.29)
Intrinsic religious belief	1.57 (0.21)	1.32 (0.85–2.05)
Are you a Christian?	3.44 (0.06)	0.38 (0.14–1.06)
Baptized	1.09 (0.30)	1.83 (0.59–5.69)

*$p < 0.05$

Table 4 Tolerance of out-groups and hostility towards out-groups occur with in-group altruism with equal frequency

	I do not blame people of other religions	I blame people of other religions
I am not willing to die for my beliefs	11 (6.7%)	7 (4.3%)
I am willing to die for my beliefs	72 (44.2%)	73 (44.8%)

associated with antagonism towards out-groups (Ginges et al. 2016) (P1). Our findings are also consistent with those of research showing that extrinsic religiosity (Allport and Ross 1967; Hall et al. 2010) and attendance at religious services (Ginges et al. 2009) are positively associated with hostility towards out-groups and negatively related to tolerant altruism (tolerance of out-groups and in-group altruism) (P2). Meanwhile, we found no evidence to support the hypothesis that in-group altruism and out-group hostility are related (Choi and Bowles 2007) (P3). The finding that religious devotion positively predicts in-group altruism (Fig. 1, Table 1) is consistent with that of previous research. Scientists across disciplines have noted a relationship between costly signaling and a commitment to religious beliefs that promote in-group cooperation and solidarity (Atran and Norenzayan 2004; Irons 1996). If signals are more reliable when they are transmitted by true believers because they are less expensive to produce, then receivers may be more likely to trust the signals (Henrich 2009). In other words, altruistic behavior directed towards in-groups may be cheaper for more devoted believers.

Our finding that religious devotion, and to a much lesser extent, intrinsic religiosity, negatively predicts out-group hostility (Table 2 and Fig. 1) is also consistent with that of other work (Morgan 1983; Preston and Ritter 2013; Ginges et al. 2016). A recent study by Ginges et al. (2016) showed that when Palestinian Muslims were asked to think from the perspective of Allah, they narrowed the degree to which they valued Palestinian lives over Jewish lives. Another study found that when college students were primed to think about God, they were more likely to help out-group members (Preston and Ritter 2013). Our results, combined with these studies, suggest that religious devotion and belief in an omnipotent God can have philanthropic effects which may increase empathy for in- and out-groups alike.

Results showing that extrinsic religious beliefs are positively associated with out-group hostility (Table 2, Fig. 1) are consistent with those of research demonstrating that extrinsic religiosity predicts racism and bigotry (Feagin 1964; Hunsberger and Jackson 2005; Allport and Ross 1967). Why should people who use religion to achieve non-religious goals (i.e., high in extrinsic religiosity) be more likely to blame members of other religious groups? Much work has shown that political and moral beliefs are strongly influenced by in-group biases, of which we are often unconscious (Haidt 2001, 2007, 2012; Cohen 2003; Trivers 2011; Gazzaniga 2012). Because extrinsic religiosity is associated with lacking the actual religious beliefs that appear to mitigate out-group hate, individuals who score higher on this scale may be more likely to use religion as a convenience to justify previously existing prejudices (Wright 2009). Evidence that attendance at religious services, but neither prayer nor intrinsic religious beliefs, positively predicts out-group hostility supports this interpretation and replicates results from six other nations (Ginges et al. 2009). It also suggests that attending religious services can build or foster commitments to coalitions (Putnam 2000). This suggests that it is the social connections that individuals make by attending religious ceremonies or by engaging in communal ritualistic activities that produce the hostility towards other religious groups. Overall, these results are consistent with the hypothesis that hostility towards out-groups is a derivative of religion's ability to bolster coalitional identities (Atran 2003; Irons 2001) and enhance within-group cooperation (Norenzayan and Shariff 2008). In other words, the social and identity-forming aspects of religion, rather than the beliefs themselves, may be what drives religious sectarianism. Overall, less generous and less tolerant attitudes both within and between groups appear to be driven by the social rather than the belief aspects of religion.

There was no evidence that in-group altruism and out-group hostility are connected in this population. Most individuals were willing to sacrifice for their beliefs, but they were split equally between hostility and tolerance for people of other religions (Table 4). Although the argument that in-group altruism and out-group hostility have co-evolved in humans has been supported by simulations (Bowles 2008; Choi and Bowles 2007) and empirical evidence (Bernhard et al. 2006; see Rusch 2014 for review), other researchers have disputed this claim (Allport 1954; Brewer 1999). De Dreu et al. (2010) found that a neuropeptide reputed to be involved in empathy, oxytocin, generates trust for members of one's own group but does not produce aggression towards others. Furthermore, experimental research with repeated prisoner's dilemma games have shown that helping in-groups and punishing out-groups are not correlated (Halevy et al. 2008). Additional work found that individuals prefer to cooperate with their own group members rather than to compete with other groups in games simulating intergroup conflict (Halevy et al. 2012). Our results support these findings and strengthen the argument that in-group altruism and out-group hostility are not necessarily linked. Of course, it is also possible that the conditions in Jamaica (e.g., low external threat and high within-group violence) do not conform to conditions that might predispose populations to parochial altruism.

In trying to understand how different aspects of religion can affect group loyalties and rivalries between groups, it may be useful to consider the dispute between ISIS and Al-

Qaeda. ISIS is composed of many [secular] Ba'athists from Saddam Hussein's former regime, and their goals tend to be territorial (Breslow 2016; Alfred 2016), while Al-Qaeda members are more likely to promote and express piety and devotion to Islam (Watts 2016). If ISIS members are more likely to hold extrinsic religious beliefs (i.e., use religion to justify their actions) and followers of Al-Qaeda are more devout, then our results may help to explain why several Al-Qaeda affiliates are critical of ISIS for its use of unrestrained violence against fellow Shia [and even Sunni] Muslims who oppose them (Byman and Williams 2016; Wong 2016).

It is important to note that our assessment of religious devotion and extrinsic religious beliefs relies on the fact that people actually believe what they are claiming to believe. Steadman and Palmer (2015), for example, points out that we are always measuring what individuals claim they believe and that the beliefs themselves may never be verified. Because we do not have access to internal states, we need to be cautious with our interpretation of these results. It is also possible that social desirability interacts with our outcome variables measuring out-group hostility and in-group altruism. It is possible that the individuals who claim that they would sacrifice themselves for their beliefs would in fact never actually do so and are merely seeking the social benefits of appearing altruistic. Although this is likely (89% reported being willing to sacrifice for their beliefs), it is unclear what social benefits are being sought by filling out an anonymous survey, but more important is the fact that the statistical result really depends on how and if these individuals differ from those who did not feel the need to report being willing to die for their beliefs. In addition, it is still unclear how the different facets of hatred of one's enemy and loyalty to one's comrades ultimately impact actual behavior. An analysis of the 2001 terrorist attacks on the USA based on extensive biographical data of the hijackers concluded that "Despite the popular accounts of the 9/11 perpetrators in the press, in-group love rather than out-group hate seems a better explanation for their behavior" (Sageman 2004). This suggests that the motivations behind altruistic and hostile acts can be interrelated and difficult to untangle. Furthermore, the distinction between extrinsic and intrinsic religiosity, upon which these results rely, is not well documented outside of Abrahamic faiths, and there are several studies that document an in-group altruism bias in other religions where the mechanism does not appear to be related to intrinsic or extrinsic orientation (Power 2017; Purzycki and Arakchaa 2013; Soler 2012). We also note that, due to time and budget constraints at the field site, some items such as "prayer frequency" and "attendance at religious services" are single-item measures and may not effectively capture all the attributes of the variable we presume to measure.

In sum, we report that religious devotion is positively associated with a reported willingness to sacrifice for one's beliefs and an increased reluctance to blame people with different beliefs. Furthermore, our results indicate that extrinsic religious beliefs and attendance at religious services increase the likelihood of blaming people from other religions. These findings suggest that boundaries between groups can be influenced by religious beliefs and practices. They are also consistent with research indicating that some attitudes, such as prejudice and hostility, may be inspired by religion but are not related to the actual content of the beliefs themselves and or devotion to religious principles (Bloom 2012). Although hostile acts perpetrated against out-groups are often carried out in the name of religion, our data suggest that the social activities which accompany religion drive the hostility towards other groups rather than the quality of one's belief or degree of devotion. Taken as a whole, these results point to a generally optimistic view of the ability for religious beliefs to generate compassion and a darker view on the social activities that promote group cohesion which may also produce hatred of others.

Acknowledgements We would like to thank Emily Lynch for several rounds of comments on the draft; the Biosocial Research Foundation for funding; and Kevin Rosenfield, Anna Latka, and Julie Elyse for administering surveys and collecting data in Jamaica.

References

Alfred, C. (2016). *The strange irony hidden among the highest ranks of ISIS*. Sydney: The Huffington Post The Huffington Post.com, n.d. Web. 15 Feb. Available from: http://www.huffingtonpost.com/2014/09/12/isis-baathist-alliance_n_5792172.html. Accessed May 20, 2016.

Allport, G. W. (1954). *The nature of prejudice*. New York: Addison, Wesley.

Allport, G. W., & Ross, J. M. (1967). Personal religious orientation and prejudice. *Journal of Personality and Social Psychology., 5*, 432–443.

Atran, S. (2003). Genesis of suicide terrorism. *Science, 299*, 1534–1539.

Atran, S., & Norenzayan, A. (2004). Religion's evolutionary landscape: counter-intuition, commitment, compassion, communion. *Behavioral and Brain Sciences., 27*, 713–730.

Atran, S. (2010). *Talking to the enemy: faith, brotherhood, and the (un)making of terrorists*. NY: Harper Collins.

Batson, D. (1982). *Religion and the individual*. New York: Oxford University Press.

Bernhard, H., Fischbacher, U., & Fehr, E. (2006). Parochial altruism in humans. *Nature, 442*(7105), 912–915.

Bloom, P. (2012). Religion, morality, evolution. *Annual Review of Psychology., 63*, 179–199.

Bowles, S. (2008). Being human: conflict: altruism's midwife. *Nature, 456*(7220), 326–327.

Boyce, M. S., Vernier, P. R., Nielsen, S. E., & Schmiegelow, F. K. (2002). Evaluating resource selection functions. *Ecological Modelling, 157*(2), 281–300.

Boyer, P. (2001). *Religion explained*. New York: Basic Books.

Breslow, J., 2016 FRONTLINE. PBS. PBS, (2014). Web. 15 Feb. Available from: http://www.pbs.org/wgbh/frontline/article/how-saddams-former-soldiers-are-fueling-the-rise-of-isis/

Brewer, M. B. (1999). The psychology of prejudice: in-group love or out-group hate? *Journal of Social Issues, 55*, 429–444.

Brooks, A. C. (2006). *Who really cares: the surprising truth about compassionate conservatism*. New York: Basic Books.

Burnham, K. P., & Anderson, D. R. (2002). *Model selection and multimodel inference: a practical information-theoretical approach* (Second ed.). NY: Springer-Verlag.

Byman D L, Williams, JR. ISIS vs. Al Qaeda: jihadism's global civil war. The Brookings Institution. Web. 15 Feb. 2016: **Available from:** http://www.brookings.edu/research/articles/2015/02/24-byman-williams-isis-war-with-al-qaeda

Cavanaugh, W. T. (2009). *The myth of religious violence: secular ideology and the roots of modern conflict*. New York: Oxford University Press.

Choi, J.-K., & Bowles, S. (2007). The coevolution of parochial altruism and war. *Science, 318*, 636–640.

Cohen, G. L. (2003). Party over policy: the dominating impact of group influence on political beliefs. *Journal of Personality and Social Psychology, 85*, 808–822.

Dawkins, R. (2006). *The god delusion*. New York: Bantam.

De Dreu, C. K., Greer, L. L., Handgraaf, M. J., Shalvi, S., Van Kleef, G. A., Baas, M., & Feith, S. W. (2010). The neuropeptide oxytocin regulates parochial altruism in intergroup conflict among humans. *Science, 328*(5984), 1408–1411.

Feagin, J. R. (1964). Prejudice and religious types: a focused study of Southern fundamentalists. *Journal for the Scientific Study of Religion, 4*(1), 3–13.

Fielding, A. H., & Bell, J. F. (1997). A review of methods for the assessment of prediction errors in conservation presence/absence models. *Environmental Conservation., 24*(01), 38–49.

Gallup Poll Religion. 2008. Retrieved June 20, 2008 from http://www.gallup.com/poll/1690/Religion.aspx

Gazzaniga, M. (2012). *Who's in charge?* Hachette: Free will and the science of the brain.

Ginges, J., Atran, S., Medin, D., & Shikaki, K. (2007). Sacred bounds on rational resolution of violent political conflict. *Proceedings of the National Academy of Sciences., 104*(18), 7357–7360.

Ginges, J., Hansen, I., & Norenzayan, A. (2009). Religion and support for suicide attacks. *Psychological Science, 20*(2), 224–230.

Ginges, J., Sheikh, H., Atran, S., & Argo, N. (2016). Thinking from God's perspective decreases biased valuation of the life of a nonbeliever. *Proceedings of the National Academy of Sciences., 113*(2), 316–319.

Graham, J., & Haidt, J. (2010). Beyond beliefs: religion binds individuals into moral communities. *Personality and Social Psychology Review, 14*, 140–150.

Haidt, J. (2001). The emotional dog and its rational tail: a social intuitionist approach to moral judgment. *Psychological Review, 108*, 814–834.

Haidt J., 2007. Moral psychology and the misunderstanding of religion. The believing primate: scientific, philosophical, and theological reflections on the origin of religion. Available from: http://www.edge.org/3rd_ culture/haidt07/haidt07_index.html.

Haidt, J. (2012). *The righteous mind: why good people are divided by politics and religion*. New York: Vintage.

Halevy, N., Bornstein, G., & Sagiv, L. (2008). "In-group love" and "out-group hate" as motives for individual participation in intergroup conflict: a new game paradigm. *Psychological Science, 19*(4), 405–411.

Halevy, N., Weisel, O., & Bornstein, G. (2012). In group love and out group hate in repeated interaction between groups. *Journal of Behavioral Decision Making., 25*(2), 188–195.

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.

Harris, S. (2004). *The end of faith: religion, terror, and the future of reason*. New York: Norton.

Henrich, J. (2009). The evolution of costly displays, cooperation and religion: credibility enhancing displays and their implications for cultural evolution. *Evolution and Human Behavior, 30*(4), 244–260.

Henrich, J., Ensminger, J., McElreath, R., Barr, A., Barrett, C., Bolyanatz, A., & Cardenas, C. J. (2010). Markets, religion, community size, and the evolution of fairness and punishment. *Science, 327*(5972), 1480–1484.

Henrich, J. (2011). The birth of high gods how the cultural evolution of supernatural policing influenced the emergence of complex, cooperative human societies. *Evolution, Culture, and the Human Mind., 119*.

Herek, G. M. (1987). Religious orientation and prejudice: a comparison of racial and sexual attitudes. *Personality and Social Psychology Bulletin., 13*(1), 34–44.

Hunsberger, B., & Jackson, L. M. (2005). Religion, meaning, and prejudice. *Journal of Social Issues., 61*(4), 807–826.

International Religious Freedom Report.Jamaica. US Department of State; 2008.

Irons, W. (1996). In our own self-image. *Skeptic, 4*(2), 50–52.

Irons, W. (2001). Religion as a hard-to-fake sign of commitment. In R. Nesse (Ed.), *Evolution and the capacity for commitment* (pp. 292–309). New York: Russell Sage Foundation.

Johnson, D. (2005). God's punishment and public goods. *Human Nature, 16*(4), 410–446.

Juergensmeyer, M. (2003). *Terror in the mind of god: the global rise of religious violence*. Berkeley, CA: Univ of California Press.

Liddle, J. R., Machluf, K., & Shackelford, T. K. (2010). Understanding suicide terrorism: premature dismissal of the religious-belief hypothesis. *Evolutionary Psychology, 10*, 343–345.

McKay, R., Efferson, C., Whitehouse, H., & Fehr, E. (2011). Wrath of god: religious primes and punishment. *Proceedings of the Royal Society of London B: Biological Sciences., 278*(1713), 1858–1863.

Morgan, S. P. (1983). A research note on religion and morality: are religious people nice people? *Social Forces, 61*, 683–692.

Norenzayan, A., & Shariff, A. F. (2008). The origin and evolution of religious prosociality. *Science, 322*(5898), 58–62.

Power, E. A. (2017). Discerning devotion: testing the signaling theory of religion. *Evolution and Human Behavior, 38*, 82–91.

Purzycki, B. G., Apicella, C., Atkinson, Q. D., Cohen, E., McNamara, R. A., Willard, A. K., & Henrich, J. (2016). Moralistic gods, supernatural punishment and the expansion of human sociality. *Nature, 530*, 327–330.

Purzycki, B. G., & Arakchaa, T. (2013). Ritual behavior and trust in the Tyva Republic. *Current Anthropology., 54*(3), 381–388.

Preston, J. L., & Ritter, R. S. (2013). Different effects of religion and God on prosociality with the in-group and out-group. *Pers. Soc. Psych. Bull., 39*(11), 1471–1483.

Putnam, R. (2000). *Bowling alone: the collapse and revival of American community*. New York: Simon and Schuster.

Putnam, R., & Campbell, D. (2010). *American grace: how religion divides and unites us*. New York: Simon & Schuster.

Richerson, P., Baldini, R., Bell, A., Demps, K., Frost, K., Hillis, V., & Ross, C. (2014). Cultural group selection plays an essential role in explaining human cooperation: a sketch of the evidence. *Behavioral and Brain Sciences., 760*, 1–71.

Rusch, H. (2014). The evolutionary interplay of intergroup conflict and altruism in humans: a review of parochial altruism theory and prospects for its extension. *Proceedings of the Royal Society of London B: Biological Sciences., 281*(1794), 20141539.

Sageman, M. (2004). *Understanding terror networks*. Philadelphia: University of Pennsylvania Press.

Soler, M. (2012). Costly signaling, ritual and cooperation: evidence from Candomblé, an Afro-Brazilian religion. *Evolution and Human Behavior, 33*(4), 346–356.

Sosis, R. (2000). Religion and intragroup cooperation: preliminary results of a comparative analysis of utopian communities. *Cross-Cultural Research., 34*(1), 70–87.

Sosis, R., & Bressler, E. R. (2003). Cooperation and commune longevity: a test of the costly signaling theory of religion. *Cross-Cultural Research., 37*(2), 211–239.

Sosis, R., Kress, H., & Boster, J. (2007). Scars for war: evaluating alternative signaling explanations for cross-cultural variance in ritual costs. *Evolution and Human Behavior, 28*, 234–247.

Steadman, L. B., & Palmer, C. T. (2015). *Supernatural and natural selection: religion and evolutionary success*. Abingdon: Routledge.

Trivers, R. (2011). *The folly of fools: the logic of deceit and self-deception in human life*. New York City: Basic Books.

Trivers, R., Manning, J. T., Thornhill, R., Singh, D., & McGuire, M. (1999). Jamaican symmetry project: long-term study of fluctuating asymmetry in rural Jamaican children. *Human Biology*, 417–430.

Watts C. (2016) ISIS and Al Qaeda race to the bottom. Foreign Affairs. (15 Feb.). Web. 15 Feb. 2016.

Welch, M. R., Sikkink, D., & Loveland, M. T. (2007). The radius of trust: religion, social embeddedness and trust in strangers. *Social Forces, 86*(1), 23–46.

West, R. (1941). *Black lamb and grey falcon: a journey through Yugoslavia*. New York: The Viking Press.

Whitley, B. E., & Kite, M. E. (2010). *The psychology of prejudice and discrimination*. CA. Wadsworth: Belmont.

Wong, K. *Five ways ISIS, Al Qaeda differ*. Washington, D.C.: The Hill Sept 20, 2014. Web. 15 Feb. 2016. Available at: website: http://thehill.com/policy/defense/218387-five-ways-isis-is-different-than-al-qaeda.

Wright, R. (2009). *Evolution of god*. New York: Little Brown.

Ysseldyk, R., Matheson, K., & Anisman, H. (2010). Religiosity as identity: toward an understanding of religion from a social identity perspective. *Personality and Social Psychology Review., 14*(1), 60–71.