

Costs do not Explain Trust among Secular Groups

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Abstract

Many human groups achieve high levels of trust and cooperation, but these achievements are vulnerable to exploitation. Several theorists have suggested that when groups impose costs on their members, these costs can function to limit freeriding, and hence promote trust and cooperation. While a substantial body of experimental research has demonstrated a positive relationship between costs and cooperation in religious groups, to date, this relationship has not held for secular groups. Here we extend this line of research by comparing trust and cooperation among 11 secular groups, including four U.S. Greek fraternities that impose high costs on their members. We find that although fraternities impose greater costs on their members than social clubs, fraternities and social clubs do not significantly differ in their levels of intra-group trust. Moreover, variation in costs does not explain variation in trust among fraternities. We suggest that the lack of an evident relationship between costs and trust in our results is because secular groups, unlike religious groups, lack repeated rituals that are coupled with supernatural ideologies. We conclude by suggesting possible avenues for future research.

Keywords

costly signaling theory – fraternities – ideologies – secular groups – trust

Introduction

Group living among social species entails significant selection pressures (Pulliam & Caraco, 1984). The benefits of group living include, among other advantages, greater and more efficient resource production. Examples of these resources include defense against predation, territorial defense, more productive food acquisition, as well as greater social status (Irons, 2001). Such resources, however, are subject to increased intra-group competition. Moreover, resources produced collectively are at risk of exploitation by freeriders who extract benefits without commensurate levels of investment (Cronk & Leech, 2012).

Yet, despite these tradeoffs, human sociality is distinguished by extraordinarily high levels of cooperation and collective action (Hill, Barton, & Hurtado, 2009; Nowak & Highfield, 2011; Ridley, 1996). This cooperation often takes place in the context of coalitions that survive across multiple overlapping membership generations, which allow groups of individuals to pursue shared interests across several domains, and achieve benefits that tend to increase over time (Cimino & Delton, 2010; Delton & Cimino, 2010; Irons, 2001; Tiger, 1969). However, while everyone benefits when all members invest in cooperative activities, this is difficult to achieve without social mechanisms that curtail incentives for freeriding. Overcoming problems of commitment are, therefore, central obstacles to realizing cooperative goals and successful coalitions in all human groups (Frank, 1988, 2001; Schelling, 1960, 2001).

When individuals can reliably commit to participation in collective goals — that is, they can be trusted — successful cooperation is more likely to emerge. Consequently, practices that encourage high levels of trust mediate and encourage cooperative activities (Sosis, 2005). But simple advertisements of cooperative willingness are relatively easy to fake and are therefore unlikely to be reliable. Under conditions in which individuals can potentially achieve net benefits through their defection, reliable signals tend to be those that are too costly for defectors to imitate (Zahavi & Zahavi, 1997).

Scholars across several disciplines have suggested that when human social groups impose significant costs on their members, these costs act to curtail incentives for individuals to freeride, thus facilitating high levels of trust and intra-group cooperation (Bulbulia, 2004; Iannacone, 1992, 1994; Irons, 1996;

2001; Kurzban & Christner, 2011; Sosis, 2003). These theorists, for the most part, were interested in how the costliness of membership obligations demanded by religious communities can help to explain the high levels of cooperation observed within these groups. Nonetheless, they assumed that the benefits of costly obligations on promoting cooperation would not be limited to religious communities, but would also extend to any group that imposes such costs on individuals seeking membership. Thus a positive correlation between costs of membership and cooperativeness was anticipated for secular groups as well (e.g., Iannacone, 1992, 1994; Irons, 1996). However, while research to date has found a positive relationship between costs and cooperation and/or trust for religious groups (e.g., Purzycki & Arakchaa, 2013; Soler, 2012), this relationship has not held for secular groups.

For example, Sosis (2000) and Sosis and Bressler (2003) examined the survivorship of 19th Century secular and religious communes in the United States. These studies showed that for every year of their existence, religious communes were more likely to survive than communes founded upon secular ideologies. Moreover, among religious communes, the number of costly obligations demanded of members strongly predicted commune longevity; religious communes with more obligations survived longer. No such relationship was found among secular communes.

Building on these studies, Sosis and Ruffle (2003) examined whether the relative economic success of Israeli religious kibbutzim compared to secular kibbutzim could be partially explained by higher levels of intra-group cooperation among members of religious kibbutzim. They conducted common pool resource experiments on over 30 religious and secular kibbutzim and found, after controlling for several possible confounds, that the members of religious kibbutzim were more cooperative than their secular counterparts. These differences in cooperation appear to be driven by higher levels of ritual obligations, most notably daily communal prayer, on religious kibbutzim (Ruffle & Sosis, 2007).

These results suggest that religious groups may be more cooperative than otherwise similarly organized secular groups, and that costly obligations may be contributing to the high levels of cooperation observed among religious groups. In these studies, costly requirements were less frequent among secular communes than religious ones, even excluding overtly religious obligations such as prayer.

In modern societies many secular groups, such as militaries, sports teams, and U.S. Greek fraternities demand that members engage in substantial costly behaviors and presumably these groups are highly cooperative. Thus, while previous studies reveal that secular groups tend to be less cooperative

than religious groups, and these differences are partially explained by differences in costly requirements, research has yet to examine whether variation in membership costs predicts variation in trust and cooperation among secular social groups with high costs of membership. Here we aim to fill this gap by examining trust and costly requirements for membership among secular social clubs and Greek fraternities at a U.S. university. U.S. college campuses consist of several multigenerational organizations that vary in their membership costs and therefore represent an ideal setting to examine the relationship between membership costs and trust among secular groups. These groups include Greek fraternities and sororities, clubs with shared academic interests (e.g., computer science club), clubs with shared extra-curricular interests (e.g., hiking club), and sports teams, among others.

Greek Organizations on U.S. College Campuses

Despite substantial variation, secular Greek organizations (i.e., fraternities and sororities) on U.S. college campuses share many features. For example, prior to full initiation, interested individuals must go through both a vetting period (called rushing) and a probationary period (called pledging). During the rush period potential initiates meet with current members and engage in activities such as sporting events or relaxed social gatherings. One purpose of these events is for both potential and current members to begin to get to know one another. More importantly, however, the ultimate goal of the vetting period is for current group members to determine, collectively, those individuals who the group would like to invite to become members. Those who survive the vetting period are formally offered an invitation to pledge (i.e., join the group). If the potential initiate accepts the invitation, s/he then enters a pledge period.

During the pledge period potential initiates are easily recognizable to other members of the University — pledges often wear pins and forms of clothing that mark them as liminal members of a specific Greek organization. Some fraternities and sororities require that pledges wear pins twenty-four hours a day. Throughout this phase the pledges of Greek organizations go through additional forms of hazing, or the enforcement of behaviors that are not important for the goals of the group (e.g., calisthenics are often required of Greek fraternity pledges, however cardiovascular health is a group-irrelevant goal) (Cimino, 2011). Hazing on U.S. college campuses appears to be relatively common; a recent study found that 36% of undergraduates had participated in at least one hazing activity during their college career (Campo, Poulos, & Sipple, 2005).

Although fraternities and sororities range widely in their extent and severity of pledging, pledges are often required to endure menial labor (e.g., cleaning

members' apartments or the group's meeting house), substantial memorization (e.g., all members' full names and birthdates), the forced drinking of alcohol, beating or paddling, calisthenics, branding or tattooing, confinement, and other forms of psychological abuse (Cimino, 2013a; Finkel, 2002). Cimino (2013a, 2013b) suggests that, in general, hazing involves current members requiring pledges to engage in "impossible" tasks or expectations. Such tasks necessarily result in failure, and pledges are subsequently punished through various forms of physical and/or psychological harassment.

Hazing events typically take place in partially ritualized settings that are attended only by pledges and full members. Across the pledge period hazing events tend to increase in frequency and intensity and often culminate in a "hell week" and/or a "hell night." A "hell week" consists of a week of organized hazing while a "hell night" is typically a night of hazing (often the last day of hell week) that ends with the full initiation of pledges.

After initiation, group members are often required to engage in activities that benefit the group and come at some cost to the individual either directly, or in the form of opportunity costs. For example, the members of most groups are expected to pay membership fees each month and attend a certain number of community-service oriented events, among other obligations. If group members fail to live up to these obligations, or other normative expectations, they can be placed on probation or expelled from the group. Generally, expulsion or quitting a group is stigmatized, whether or not it occurs after full initiation or during the pledge period. In other words, people are not free to move between Greek organizations, and because of the large number of post-initiation requirements, membership in a Greek organization inhibits (although does not necessarily preclude) membership in non-Greek campus organizations. By agreeing to pledge a fraternity or sorority, then, individuals pre-commit themselves to one specific social group for the duration of their college career.

Greek membership on U.S. college campuses can often entail these considerable costs, but there is evidence that they may yield substantial benefits. Importantly, members of Greek organizations have larger social networks, a social resource that is particularly beneficial in securing internships and employment after college (Abelson & Faux, 2013). Moreover, membership in a Greek organization often returns prestige and status among the larger University population (Ramey, 1982, as cited in Cimino 2013a; 2013b; Ramey, 1982).

Social Clubs on U.S. College Campuses

In addition to Greek organizations, there are a tremendous number of social clubs on U.S. college campuses. Academic clubs range from those whose

members share an interest in an academic topic to those who maintain a certain grade point average. Non-academic clubs are incredibly diverse and span a range of topics and interests including: music genres, multiple forms of dance and comedy, sports and recreational activities, ethnic and religious groups, political parties, and those formed around social ideals, among many others.

In contrast to Greek organizations, social clubs are less exclusive and appear to require fewer pre- and post-initiation costs of members. The majority of social clubs lack a vetting or probationary period. Quitting, or a forced removal from, a social club likely does not carry the same social stigma as would quitting a Greek organization. Moreover, for the most part, students are able to join many social clubs and invest in them to the extent to which they feel comfortable, rather than have minimal levels of investments dictated by group expectations.

To summarize, secular university groups vary in terms of costs and benefits, with many groups enforcing substantial costs on their members, both prior to and after full initiation. Although previous research among secular groups has failed to find an association between membership costs and trust, this work has failed to examine secular groups with high costs of membership. Drawing from applications of costly signaling theory to the study of intra-group trust (Iannacone, 1992, 1994; Irons, 1996; Sosis, 2000), we hypothesized that university groups with costlier obligations would exhibit higher levels of intra-group trust than university groups with less costly obligations.

Materials and Methods

Study Design

In order to test the hypothesis that secular groups that impose high costs on their members exhibit higher levels of intra-group trust, we compared initiation costs and costs of participation against a behavioral measure of trust and self-rated trust among four fraternities, four social clubs, and three classes. Classes do not share many of the features of the other social groups in the study, yet their members are drawn from the same population of students that join fraternities and social clubs. Notably, because there are no costs for joining a class (other than university fees that all students pay), nor costs of participation (other than those associated with academic evaluation), levels of trust within classes serve as a trust baseline for the population. Moreover, because classes are not social groups, yet their members do engage in some degree of social interaction, classes functioned as a control group.

Participants

Participants were 236 undergraduate students enrolled at the University of Connecticut. Of these participants (M age = 20.07 years; SD = 2.03; Range = 18–34), 141 (59.7%) were males. In total, participants were unequally distributed across three sections of three introductory anthropology classes (n = 66), four all-male Greek fraternities (n = 78), and four coed student groups (n = 92). The student groups consisted of two groups with shared majors, an academic excellence club, and a coed service fraternity. Although similar in name, the coed service fraternity critically differs from the all-male Greek fraternities sampled in our study because it is a social group that focuses on service rather than purely social goals. The external focus of the coed service fraternity, as well as its coed composition, makes it more similar to shared major groups and the academic excellence group than Greek fraternities. Below, for convenience, we refer to these coed student groups, including the service fraternity, as “clubs.” For additional demographic information see Table 1.

Fraternities

Three of the four fraternities maintained semester-long pledge periods, and two fraternities required pledges to pass through a hell week before they were granted membership. All fraternities maintained secret knowledge, even the fraternity that did not have a pledge period or hell week. Membership dues for fraternities ranged from \$50 to \$400 per semester. Lastly, all fraternities reserved the right to expel disruptive or financially delinquent members, but only two of the four fraternities reported expelling members in living memory.

All fraternities in our sample had active event calendars that included business meetings, service activities, house cleanings, and social events such as parties and sports competitions. Attendance is taken at most events but non-attendance was not punished in any fraternity. One fraternity maintained a point system to track attendance, but this was used for rewarding participation rather than punishing absence. All fraternities reward particularly active members with special recognition.

Clubs

Of the student clubs we sampled only the coed service fraternity had a pledge period. The pledge period usually lasts about 8–9 weeks and requires pledges to maintain an 80% average on quizzes about the fraternity’s history and bylaws, engage in 35 hours of service, plan a pledge class event, and make pledge paddles for a big brother/sister. Membership dues are \$65 per semester. Once the pledge period is completed, members are required to attend weekly meetings

TABLE 1 Descriptive statistics for group types and groups

	Fraternities					Clubs				Classes		
	α	β	γ	δ	ϵ	GSF	AEC	SMC 1	SMC 2	Class 1	Class 2	Class 3
<i>N</i>	20	20	22	16	24	24	24	24	20	24	24	18
Group size	55	34	27	25	55	55	28	34	250			
% Males	100	100	100	100	25	25	20.8	42.7	50	70.8	33.3	38.9
Pledging length [weeks]	6.5	7.5	7	0	9	9	0	0	0			
Hell week	Yes	No	Yes	No	No	No	No	No	No			
Self-rated trust [1-7]	5.9	5.7	5.6	6.4	5.4	5.4	5.5	6.1	5.4	4.8	4.0	4.2
Mean proportion sent by A	82.3%	93.3%	83.0%	88.3%	64.7%	64.7%	61.7%	78.3%	71.7%	41.9%	58.6%	73.3%
Mean proportion sent by B	38.3%	56.9%	62.0%	71.0%	51.4%	51.4%	49.4%	50.9%	38.3%	38.3%	40.2%	45.2%

NOTE THAT FRATERNITY NAMES ARE PSEUDONYMS. CLUBS: COED SERVICE FRATERNITY (CSF), ACADEMIC EXCELLENCE CLUB (AEC), SHARED MAJOR CLUB 1 (SMC1), AND SHARED MAJOR CLUB 2 (SMC2).

and to complete 20 hours of community service per semester. If members fail to attend a project for which they have signed up, the hours are deducted from their semester total. Members who miss three or more weekly meetings, fail to complete 20 hours of community service, or fail to pay dues, are dismissed from the service fraternity.

Two shared-major clubs — that is, clubs whose membership requires enrollment in a particular major — were included in our sample. One of the clubs required members to pay \$10 annually and attend three events each semester. The other shared-major club had no membership fees and required attendance at six events per semester. Events for both clubs include meetings, social events, and community projects. There are no penalties in either club for failing to attend club events.

The academic excellence club is open to all students who achieve a 3.5 GPA during their first year at the university. Activities include weekly meetings, service activities, and social events. Students in the academic excellence club can earn “points” for attending club events, and those who attend seven events are awarded with a “Distinguished Member” title. Loss of academic standing is grounds for dismissal from the club. There are no membership fees or penalties for lack of attendance at meetings or programs.

Classes

We sampled groups of students enrolled in sections of three large introductory anthropology classes (typically between 100–300 students each). Sections are groups of about 15–25 students who meet with a graduate teaching assistant for an hour each week to discuss the lecture material covered by the professor of the course. Each section we sampled was part of a different introductory class. Introductory anthropology courses at the University of Connecticut fulfill a general education requirement and are consequently taken by students enrolled in the full gamut of majors at the university. Attendance at sections counts toward students' grades.

Procedure

Participants from all groups played a trust investment game designed to measure trust and trustworthiness between pairs of individuals (Berg, Dickhaut, & McCabe, 1995). In the trust game participants are anonymously paired and randomly assigned to the role of either trustor (henceforth Player A) or trustee (henceforth Player B). Both participants start with equal endowments; however, Player B's endowment never enters game play. In the initial decision-making task, Player A sends any amount of her endowment to Player B. If Player A sends none of her endowment, the game ends. If Player A sends some

or all of her endowment, this amount is tripled and then sent to Player B. In the second stage of the experiment, Player B decides how much, if any, of her received amount to send back to Player A. The amount Player A sends to Player B in the first round of the game assesses trust since Player A's investment represents a risk that Player B will return less money than was sent, while the amount returned by Player B measures her trustworthiness (Camerer, 2003).

To recruit participants from fraternities and clubs we contacted their presidents and arranged times for their members to participate in the experiment. The teaching assistants responsible for leading sections recruited participants from each of the three introductory classes. Participants arrived as groups to the Department of Anthropology at the University of Connecticut. Individual participants were taken one-by-one to a predetermined office by a research assistant. Research assistants were paired (one with Player A and the other with Player B) and communicated participants' game decisions by cell phone. All office doors were closed and five to seven experimental pairs were run simultaneously to assure anonymity. Following game play and interviews, participants were invited to eat pizza in the company of researchers, where they discussed their impressions of the experiments. Participants, however, were not allowed to discuss their game decisions and were encouraged to keep these decisions private even after leaving the anthropology department.

Both Player A and Player B started with endowments of 15 USD. Research assistants explained the procedure and participants had to pass a game comprehension check before they were allowed to make their decision. Following the decision-making task, all participants were asked questions that assessed the costs and benefits of group membership, self-rated trust in the group, several demographic questions, and questions designed to measure religiosity. We examined religiosity because prior studies have found a positive relationship between religiosity and trust (Ahmed, 2009; Ahmed & Salas, 2011; Tan & Vogel, 2008). To assess religiosity, we asked each participant to rate their belief in God, their belief that God determines when a person dies, and their frequency of attendance at a religious house of worship. These measures were then standardized and used to construct a religiosity scale (Cronbach's $\alpha = .81$).

Costs of Membership

All behaviors incur some costs to individuals and some behaviors entail greater costs than others. The costs of any behavior can include energetic expenditures, temporal costs, and a multitude of opportunity costs. Accurately quantifying the relative costs of behaviors is therefore inherently difficult. To operationalize the costs of group membership and group participation, we follow the approach of Sosis (2000) and Sosis and Bressler (2003) and assess

the additive effect of behaviors, rather than attempt to quantify relative costs among them. This approach assumes that there is a monotonically increasing relationship between the number of group directed behaviors performed by members and the cost incurred by those members.

To investigate costs, we created two scales related to participation (Cronbach's alpha = .71) and pledge costs (Cronbach's alpha = .65). All variables included in the scales were z-scored and combined to create scores for particular scales. Since these scales are not meant to constitute general psychometric tests, the Cronbach's alphas are at acceptable levels. The pledge cost scale included responses to the following questions: How long was your pledge period?; Did it include a hell week?; and How difficult was your pledge period? The participation cost scale included answers to the following questions: How many meals per week do you eat with other members?; How many nights in a week do you spend at the fraternity house?; How many functions do you attend in your fraternity per week?; How active are you in your fraternity?; and, How many favors do you do for other members per week?

Several days after these games and interviews, one of us interviewed the leader of each of the clubs (SD) and fraternities (JHS) to gather more specific ethnographic information about each group. Interviews with fraternity leaders concerned pledge programs, the length and difficulty of pledging, the existence of a hell week, and prior instances of group member expulsions. All procedures were approved by the Institutional Review Board at the University of Connecticut and all participants granted informed consent.

Analyses

The relationship between predictors and the amount sent by Player A and the amount returned by Player B was analyzed in R (version 3.0.3, R Core Team, 2014). Since monetary allocation was bounded by minimal and maximal contributions for Player A (0 to 15 \$USD), we divided Player A's allocation by the total endowment (\$15) to obtain a proportion of the endowment sent to Player B (Johnson & Mislin, 2011). For Player B, we calculated the proportion of received money that was sent back to Player A. To account for a distribution of proportions with lower and upper bounds of 0 and 1, we fit a beta regression (Eskelson & Madsen, 2011; Smithson & Verkuilen, 2006) using the function *gamlss* (*gamlss* package; Stasinopoulos & Rigby, 2007). Beta regression uses a logit link function to account for the typical features of proportional data such as heteroscedasticity and skewness (Cribari-Neto & Zeileis, 2010; Stasinopoulos & Rigby, 2007). To incorporate extreme values of 0 and 1, we transformed our dependent variables using the formula $(y' = (y \cdot (n - 1) + 0.5) / n)$, where y

is the transformed variable and n is the sample size (Smithson & Verkuilen, 2006).

Due to the clustered nature of our data (participants were nested within specific classes/clubs/fraternities), we added random intercepts for each group into the models. Using a bottom-up approach (West, Welch, & Galecki, 2007), we first added random effects and then fixed effects on the basis of their overall improvement of the model (Akaike Information Criterion with ChiSq test ($p < .05$)). After determining the best fitting models, the logit estimates of means were converted back to proportions using an inverse link function for means ($\beta_i = e^{\beta_i} / 1 + e^{\beta_i}$) and the Delta Rule for standard errors of the means ($\sigma_{\mu i} = \beta_i(1 - \beta_i) \cdot \sigma_{\mu i}$). Finally, an inverse transformation formula ($y = (y' \cdot n) / (n - 1) + 0.5$) was used to obtain unbiased coefficients. The predictors considered for each of the main models included age, group-type, religiosity, and sex. Due to their theoretical importance, sex and group-type were retained in all models. To model the fraternity data, we considered age, group size, pledge costs, participation costs, religiosity, and years since pledging. Since we were interested in the effects of group size, participation cost, pledging cost, and years since pledging, these variables were retained in all of the fraternity models.

Results

Self-rated Trust

Fraternities and clubs did not differ in their self-rated trust in other group members ($p = 0.958$), but both fraternities and clubs trusted their members more than participants enrolled in class sections together ($p < 0.001$; Figure 1A). Males reported greater trust in their group members than females ($p = 0.008$) and a person's religiosity was positively associated with self-rated trust in their group ($p = 0.027$). These results are displayed in Table 2, model 1, and the full model is listed in the Appendix.

Trust Game Results, Player A

Overall, the average amount sent by Player A to Player B for fraternities was \$12.93 (SE = 0.59), \$10.35 (SE = 0.58) for clubs, and \$8.36 (SE = 0.80) for class sections. The average amount returned by Player B to Player A for fraternities was \$22.42 (SE = 1.92), \$14.99 (SE = 1.42) for clubs, and \$11.18 (SE = 1.52) for class sections. First, we assessed which predictors explained significant variation in the amount sent by Player A to Player B. Group type was dummy coded, with

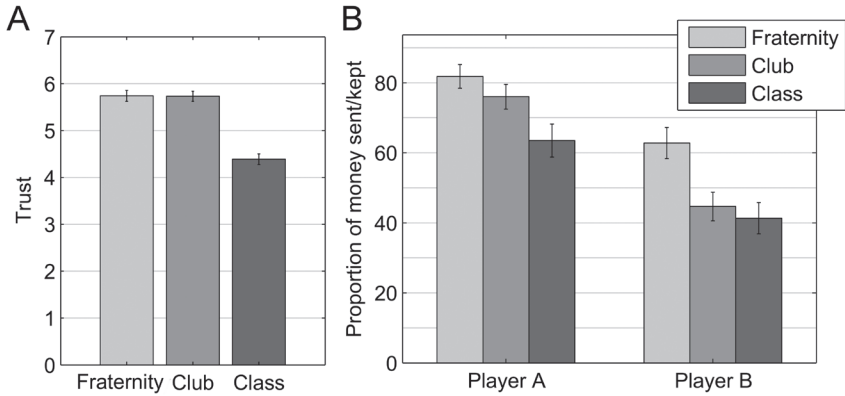


FIGURE 1 Predicted means and \pm SEM for Self-rated Trust and Game decisions for Players A and B Divided by Group-type. Predicted means with \pm SEM for (A) self-rated trust and (B) the trust game controlling for sex and religiosity. The differences between fraternities and clubs in predicted means for self-rated trust and Player A are not significant, but both differ significantly from class sections. The mean predicted investment for Player B is significantly higher in fraternities than clubs and class sections.

TABLE 2 Estimated differences (with standard error of differences) for Model 1: self-rated trust in other group members; Model 2: proportion of money sent by Player A to Player B; and Model 3: proportion of money returned by Player B to Player A. Intercept is the Fraternity group

	Model		
	(1) Self-rated trust	(2) Player A	(3) Player B
Intercept	5.74 (0.120)***	81.795 (3.394)***	62.764 (4.462)**
Group: fraternities vs. clubs	-0.009 (0.176)	-5.787 (5.094)	-18.103 (6.749)**
Group: fraternities vs. classes	-1.351 (0.173)***	-18.281 (6.002)**	-21.445 (6.696)**
Sex: females vs males	0.413 (0.155)**	4.628 (3.545)	-5.44 (5.746)
Religiosity	0.137 (0.061)**	-3.575 (1.660)*	
Cox-Snell R ²	0.358	0.188	0.105

† p < 0.1; *p < 0.05; **p < 0.01; ***p < 0.001

fraternities set as the reference category. For sex, females were set as the reference category. Additionally, a person's religiosity was centered to make the intercept meaningful.

Using post-hoc pairwise comparisons with false discovery rate corrections (Benjamini & Hochberg, 1995), the amount sent by Player A to Player B was significantly greater for fraternities compared to the class sections ($p = .001$), but not significantly different from the amount sent by Player A in clubs ($p = .258$; Figure 1B). Further pair-wise comparisons revealed that the amounts sent by Player A were significantly higher for clubs compared to class sections ($p = .038$). Additionally, there was a significant negative influence of religiosity on the amount sent by Player A ($p = .033$). The effect of sex was not significant ($p = .194$), but it was retained in the model to account for the unequal distribution of males and females across our group type variable (Table 2, model 2 and Figure 1, Player B; full model in the Appendix). When the sex effect is removed from the model, the difference between fraternities and clubs becomes significant ($p = .021$); however, this effect does not hold in analyses of only males in fraternities and clubs ($p = .390$). This suggests that our sampling method did not allow for separating the effects of group type from sex in these models. Figure 2 displays histograms of Player A decisions for each group type for each sex.

Trust Game Results, Player B

We assessed the amount returned by Player B to Player A as a proportion (amount sent/amount received). Again, using a bottom-up approach, we added predictors on the basis of significant improvements in models. For the proportion returned by Player B, only group type and sex significantly improved model fit. The inclusion of the sex variable functions as a control for the unequal distribution of males and females across groups.

The results of this model are shown in Table 2, model 3, and the full model is specified in the Appendix. Using post-hoc pairwise comparisons with false discovery rate corrections, the results show that fraternity members sent back a significantly higher proportion of the amount they received from Player A compared to members of clubs ($p = .012$) and class sections ($p = .006$). Additional pair-wise comparisons showed that the difference between clubs and class sections was not significant ($p = .573$) (Figure 1B).

Because we did not analyze our data using ANOVA, estimation of Cohen's d would be problematic and might bias power analysis. However, as an estimate, we performed a post-hoc power analysis on detecting a difference in investments between fraternities and clubs. Given the number of participants per

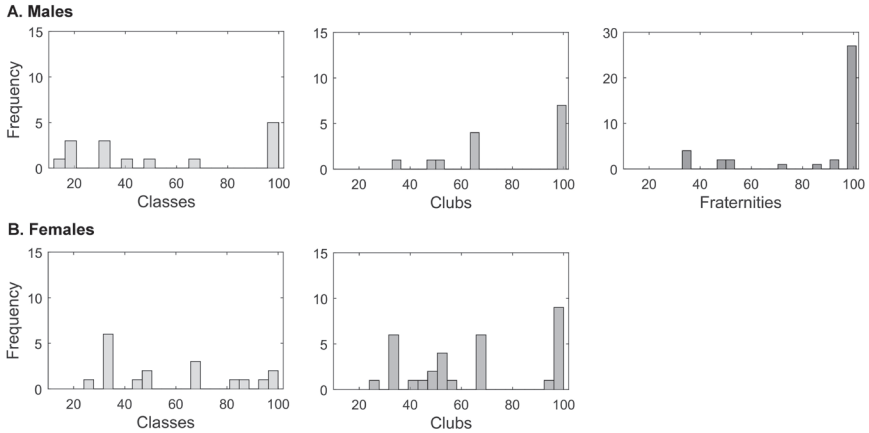


FIGURE 2 *Histograms of Player A's decisions in the Trust game by sex among classes, clubs, and fraternities. Histograms illustrate that the effect of fraternities disappears after accounting for sex differences.*

cell in these two conditions (84 in total), the analysis revealed that we would be able to detect effect sizes of 0.15 with the conventional 80% power.

Fraternity Costs and Trust

We regressed pledge costs and participation costs for the fraternities controlling for the effect of group size and length of membership; however, neither scale significantly predicted the proportion sent by Player A, or the proportion returned by Player B (Table 3). This may be due, in part, to the fact that there was low variance in the amount sent by Player A in fraternities (mode = 100%). The only significant effect we observed was a negative association between self-rated trust and pledge costs, suggesting that in some fraternities very harsh pledge periods might negatively affect their participants.

We could not investigate the difference in pledge costs between clubs and fraternities since only one club had a pledge period; however, the standardized participation costs in clubs ($M = -0.139$, $SE = 0.055$) were significantly lower than in fraternities ($M = 0.150$, $SE = 0.058$; $p < .001$). Overall, these results suggest that neither the costs of pledging, nor the costs of participation play a significant role in increasing trust between members of the secular groups in our sample, although both types of costs are significantly greater for fraternities.

Shared Goals of Social Clubs

One of the social clubs in our study was a service-oriented group whose members presumably share the goal of community service, and this shared goal

TABLE 3 *Estimated differences (with standard error of differences) for the fraternities. Model F1: self-rated trust in other group members; Model F2: proportion of money sent by Player A to Player B; and Model F3: proportion of money returned by Player B to Player A. Intercept is the mean of all predictors*

	Fraternity models		
	(F1) Self-rated trust	(F2) Player A	(F3) Player B
Intercept	5.883 (0.096)***	86.245 (3.088)***	59.598 (4.347)***
Pledge costs	-0.328 (0.153)*	0.074 (3.300)	-9.717 (7.412)
Participation costs	0.186 (0.142)	-1.880 (3.253)	7.355 (6.613)
Group size	0.011 (0.009)	-0.107 (0.212)	-0.730 (0.442)
Years since pledging	-0.148 (0.085)†	0.804 (1.792)	3.260 (3.944)
Cox-Snell R ²	0.151	0.019	0.252

† p < 0.1; *p < 0.05; **p < 0.01; ***p < 0.001

perhaps positively impacts trust. To further investigate possible differences between clubs, we created a separate model with club type as a categorical predictor and compared least-squared means between clubs with Tukey corrections (Table 4). The only significant difference we observed was higher self-rated trust in one of the shared major clubs (SMC1) compared to the coed service fraternity.

Discussion

The aim of this study was to test the hypothesis that high cost secular groups exhibit greater intra-group trust than secular groups that impose fewer costs. Our results show that although fraternity membership required greater costs than social club membership, fraternities and clubs did not differ in their average level of self-rated trust nor in their trust as measured in a trust game. Moreover, differences in costs did not explain differences in levels of trust between the fraternities themselves. While we did not find a significant difference in trust between fraternities and clubs, both groups trusted significantly more than the members of class sections. The increased trust in fraternities and clubs relative to class sections is probably best explained by the increased

TABLE 4 *Estimated differences (with standard error of differences) between different clubs with Tukey corrections. Model F1: self-rated trust in other group members; Model F2: proportion of money sent by Player A to Player B; and Model F3: proportion of money returned by Player B to Player A. Clubs: Coed Service Fraternity (CSF), Academic Excellence Club (AEC), Shared Major Club 1 (SMC1), and Shared Major Club 2 (SMC2)*

	Fraternity models		
	(F1) Self-rated trust	(F2) Player A	(F3) Player B
CSF vs. AEC	-0.125 (0.266)	3.030 (10.599)	1.998 (9.586)
CSF vs. SMC1	-0.750 (0.261)*	-13.496 (10.599)	0.525 (9.586)
CSF vs. SMC2	-0.054 (0.304)	-6.886 (11.116)	13.056 (10.054)
AEC vs. SMC1	-0.625 (0.266)	-16.525 (10.599)	-1.473 (9.586)
AEC vs. SMC2	0.071 (0.309)	-9.915 (11.116)	11.059 (10.054)
SMC1 vs. SMC2	0.696 (0.304) [†]	6.610 (11.116)	12.532 (10.054)

[†] p < 0.1; *p < 0.05; **p < 0.01; ***p < 0.001

interaction and shared identities of fraternity and club members. In general, these findings suggest that the high levels of costs imposed by these secular groups are not associated with significantly higher levels of trust.

All groups we investigated did exhibit high levels of trust, and it is possible that we failed to find a relationship between costs of membership and trust because of the methods we employed, and/or the populations we sampled. The modal response for Player A in the fraternities was to give all of their endowment to Player B. The results show a trend, though insignificant, toward a positive relationship between costs and trust among fraternities. Perhaps if we had increased the stakes, the fraternity members would have given significantly more than the clubs. However, a recent meta-analysis of 162 trust game studies showed that increasing Player A's endowment did not significantly increase the amount sent to Player B (Johnson & Mislin, 2011). Moreover, the positive effect of costs on Player A's decisions in the trust game is attenuated after accounting for the effect of sex. Sampling from all-female groups, such as sororities, would not allow us to further assess the effect of sex because the members of all-female groups face different decisions-making contexts than mixed-sex groups and all-male groups.

We may have also failed to find a relationship because of the difficulty associated with collecting data about fraternity rituals, especially pledge rituals.

Revealing fraternity secrets about initiation rites can be grounds for expulsion, and thus gathering information about these events is challenging. In an attempt to overcome this obstacle, we conducted in-depth and anonymous interviews with the leader of each fraternity at each fraternity house. The leaders did divulge a substantial amount of secretive material, and we were able to gather considerable information about pledge rites, but these data likely only reveal some of the initiation costs that fraternities impose on their members. Still, from these leader interviews we were able to assess the impact of pledging, pledge length, and the existence of a hell week, in addition to the costs imposed on fully initiated members. However, even with these relatively rich data we failed to find a relationship between severity of costs and trust.

We did find that fraternity Player Bs returned a significantly greater amount than Player Bs in the clubs or classes. Johnson and Medlin (2011) found that the proportional amount returned to Player As was significantly influenced by the proportion of the endowment that Player As initially sent; Player Bs who received more, returned more. The decisions by Player Bs therefore represent a measure of reciprocity that is largely based on the amount they receive. It is possible that the members of fraternities are more trustworthy than club members, but this is difficult to deduce from our results. It is more likely that because the amount that Player A sends to Player B was tripled in our experiments, the insignificant differences between the amount sent between fraternities and clubs reached significance after tripling.

These results add to a growing body of research indicating that although costs are positively correlated with trust and cooperation among religious groups, these relationships do not hold for secular groups (Ruffle & Sosis, 2007; Sosis & Bressler, 2003; Sosis & Ruffle, 2003, 2004). A fundamental difference between the rites of secular and religious groups is that the rituals of secular groups are mostly confined to initiation rites (e.g., hell nights, pledge periods), while among religious communities rituals often take place frequently and repeatedly over time (e.g., weekly worship services) after initiation. It is possible that the ongoing repetition of rituals, characteristic of many religions, is what encourages high levels of intra-group trust and cooperation.

Additionally, while both secular and religious organizations have ideologies and myths associated with the group, only religious belief systems appeal to supernatural ideologies, and the coupling of supernatural beliefs with religious ritual may create a stronger sense of group belonging than rituals based on secular ideologies (Purzycki & Sosis, 2013; Rappaport, 1999; Sosis & Bressler, 2003; Sosis & Ruffle, 2004). Thus, the lack of repeated rituals outside of initiation rites and a lack of supernatural ideologies associated with the group each may partially explain the findings reported here.

Rather than, or in addition to, differences in ritual frequency it may be that the unfalsifiable nature of supernatural beliefs directly contributes to the higher levels of trust experienced by religious communities (Rappaport, 1999). Unlike secular ideologies, the members of religious communities are bound by commitment to ideologies that are deeply felt and experienced as true despite their unverifiable nature (Bulbulia 2009; Bulbulia & Sosis, 2009). Deeply felt commitment to ideologies associated with supernatural worlds, often made sacred through ritual practice, may have greater binding effects than mundane empirically verifiable ideologies (Alcorta & Sosis, 2005).

Regardless, the findings reported here are limited in several regards. First, we only indirectly assessed trust through interviews and an economic game. Ethnographic research designs that directly observe cooperation within institutionalized social groups would provide insights about the dynamics of intra-group trust and further elucidate the findings reported here. Second, although experimental studies show that shared collective goals increase cooperation (Mitkidis, Sørensen, Nielbo, Andersen, & Lienard, 2013), we did not attempt to interview participants about the existence of shared goals associated with the group. It is possible that the members of clubs share similar goals (e.g., community service, getting good grades), while most fraternities lack shared and specific goals, at least amongst all members. It remains possible that both costs imposed on members and commitment to shared goals contributes to increased trust. That is, because many fraternities lack shared goals but foster trust by imposing costs, while clubs might encourage trust with shared goals but without imposing significant costs, we failed to find a difference between these two types of groups.

It is also possible that the benefits to costly membership in the secular groups investigated here are not directly related to intra-group trust, but rather to relative advantages in the mating pool. If correct, we would expect that costs would be associated with both number of sexual partners and perceived attractiveness. Some data appear to support this possibility, as the severity of hazing during initiation was found to be positively associated with prestige across 29 fraternities at the University of Washington, and across 31 chapters (i.e., across 31 universities) of the same fraternity (See Cimino, 2013a; 2013b). Perhaps the members of high cost groups translate prestige into increased mating opportunities, and such a possibility is an avenue for future research. In other words, it is possible that the high costs paid by the members of some religious and secular communities return fundamentally different benefits. The benefits of increased trust and increased attractiveness to potential mates, however, are not necessarily mutually exclusive.

Conclusion

Throughout human history religions have influenced social organization. Although a large number of secular social groupings exist today, these are largely confined to modern large-scale industrialized societies (Norris & Inglehart, 2004). Purely secular social groupings are relatively absent from the cross-cultural record and the non-Western societies traditionally studied by anthropologists. Despite their recent evolutionary emergence, however, secular groups share many attributes with religious groups. Both religious and secular groups have secret knowledge available only to full members, both frequently require that new members go through initiation rites, and both require that members follow norms lest they be punished or banished. Additionally, both religious and secular groups seem to favor adolescence as the appropriate period for initiation, and human adolescents appear more motivated to join groups than do humans at other stages of the lifespan (Alcorta, 2006; Lienard, 2011; Shaver & Sosis, 2014). Although many have pointed out the drawbacks of studies that rely too heavily on data drawn from U.S. undergraduate samples (e.g., Sears, 1986), in the case of high cost secular groups, they are an inherently important population to investigate.

Regardless, future research ought to examine the features of shared goals and ideologies that may impact trust, the extent to which such sharing encourages cooperation, and how different goals interact with costly requirements for membership. Work should also investigate the possibility that similar levels of costly requirements return fundamentally different types of benefits among different types of social organizations (i.e., religious vs. secular). Such undertakings would further extend this line of research, clarify the findings reported here, and contribute to our understanding of how different social groups are able to maintain and motivate divergent levels of trust and cooperation.

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References

- Abelson, M. & Faux, Z. (2013). Secret Handshakes Greet Frat Brothers on Wall Street. *Bloomberg News*. Retrieved from: <http://www.bloomberg.com/news/articles/2013-12-23/secret-handshakes-greet-frat-brothers-on-wall-street>.
- Ahmed, A. M. (2009). Are Religious People More Prosocial? A Quasi-Experimental Study with Madrasah Pupils in a Rural Community in India. *Journal for the Scientific Study of Religion*, 48, 368–374.
- Ahmed, A. M., & Salas, O. (2011). Implicit influences of Christian religious representations on dictator and prisoner’s dilemma game decisions. *The Journal of Socio-Economics*, 40, 242–246.
- Alcorta, C. S. (2006). Religion and the life course: Is adolescence an “experience expectant” period for religious transmission? In P. McNamara (Ed.), *Where God and science meet: How brain and evolutionary studies alter our understanding of religion*, Vol. 1: Evolution, genes, and the religious brain (pp. 55–79). Westport: Praeger.
- Benjamini, Y., and Hochberg, Y. (1995). Controlling the false discovery rate: a practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society Series B* 57, 289–300.
- Berg, R.J., Dickhaut, J., McCabe, K. (1995). Trust, reciprocity, and social history. *Games and Economic Behavior*, 10, 122–142.
- Bulbulia, J. (2004). Religious costs as adaptations that signal altruistic intention. *Evolution and Cognition*, 10, 19–38.
- Bulbulia, J. (2009). Religiosity as mental time-travel. In J. Schloss & M. Murray (Eds.). *The Believing Primate: Scientific, Philosophical, and Theological Reflections on the Origin of Religion: Scientific, Philosophical, and Theological Reflections on the Origin of Religion* (pp. 44–75). OUP Oxford: Oxford University Press.
- Bulbulia, J., & Sosis, R. (2009). Ideology as cooperative affordance. *Behavior and the Brain Sciences*, 32(6), 515–516.
- Camerer, C. (2003). *Behavioral game theory: Experiments in strategic interaction*. Princeton NJ, University Press, Princeton.
- Campo, S., Poulos, G., & Sipple, J. W. (2005). Prevalence and profiling: Hazing among college students and points of intervention. *American Journal of Health Behavior*, 29(2), 137–149.
- Cimino, A. (2011). The evolution of hazing: Motivational mechanisms and the abuse of newcomers. *Journal of Cognition and Culture*, 11(3–4), 241–267.

- Cimino, A. (2013a). *Hazing as a manifestation of evolved psychology*. Doctoral dissertation. University of California, Santa Barbara.
- Cimino, A. (2013b). Predictors of hazing motivation in a representative sample of the United States. *Evolution and Human Behavior*, *34*, 446–452.
- Cimino, A., & Delton, A. W. (2010). On the perception of newcomers. *Human Nature*, *21*, 186–202.
- Cribari-Neto, F., & Zeileis, A. (2010). Beta regression in R. *Journal of Statistical Software*, *34*, 1–24.
- Cronk, L., & Leech, B. L. (2012). *Meeting at Grand Central: understanding the social and evolutionary roots of cooperation*. Princeton: Princeton University Press.
- Delton, A. W., & Cimino, A. (2010). Exploring the evolved concept of NEWCOMER: Experimental tests of a cognitive model. *Evolutionary psychology: an international journal of evolutionary approaches to psychology and behavior*, *8*, 317.
- Eskelson, B., & Madsen, L. (2011). Estimating Riparian understory vegetation cover with Beta regression and copula models. *Forest Science*, *57*, 212–221.
- Finkel, M. A. (2002). Traumatic injuries caused by hazing practices. *The American journal of emergency medicine*, *20*(3), 228–233.
- Frank, R. (1988). *Passions within reason*. New York: Norton.
- Frank, R. (2001). Cooperation through emotional commitment. In R. Nesse (ed.), *Evolution and the capacity for commitment* (pp. 57–76). New York: Russell Sage Foundation.
- Hill, K., Barton, M., & Hurtado, A. M. (2009). The emergence of human uniqueness: characters underlying behavioral modernity. *Evolutionary Anthropology*, *18*(5), 187–200.
- Iannaccone, L. (1992). Sacrifice and stigma: Reducing free-riding in cults, communes, and other collectives. *Journal of Political Economy*, *100*, 271–291.
- Iannaccone, L. (1994). Why strict churches are strong. *American Journal of Sociology*, *99*, 1180–1211.
- Irons, W. (1996). Morality, religion, and human nature. In W. Richardson and W. Wildman (Eds.), *Religion and science: History, method, and dialogue* (pp. 375–399). New York: Routledge.
- Irons, W. (2001). Religion as a hard-to-fake sign of commitment. In R. Nesse (ed.), *Evolution and the capacity for commitment* (292–309). New York: Russell Sage Foundation.
- Johnson, N. D. & Mislin, A. A. (2011). Trust games: A meta-analysis. *Journal of Economic Psychology*, *32*, 865–889.
- Kurzban, R., & Christner, J. (2011). Are supernatural beliefs commitment devices for intergroup conflict? In J. Forgas, A. Kruglanski, & K. Williams (Eds.), *The 13th Sydney Symposium of Social Psychology: Social Conflict and aggression* (pp. 285–300). New York: Psychology Press.
- Leinard, P. (2011). Life-stages and risk avoidance: status and context-sensitivity in precaution systems. *Neuroscience and Biobehavioral Reviews*, *35*, 1067–1074.

- Mitkidis, P., Sørensen, J., Nielbo, K. L., Andersen, M., & Lienard, P. (2013). Collective-goal ascription increases cooperation in humans. *PLoS ONE* 8(5): e64776.
- Norris, P., & Inglehart, R. (2011). *Sacred and secular: Religion and politics worldwide*. Cambridge: Cambridge University Press.
- Nowak, M., & Highfield, R. (2011). *SuperCooperators: Altruism, evolution, and why we need each other to succeed*. Simon and Schuster.
- Pulliam, H. R., & Caraco, T. (1984). Living in groups: is there an optimal group size. *Behavioural ecology: an evolutionary approach*, 2, 122–147.
- Purzycki, B. G., & Arakchaa, T. (2013). Ritual behavior and trust in the Tyva Republic. *Current Anthropology*, 54(3), 381–388.
- Purzycki, B. G., & Sosis, R. (2013). The extended religious phenotype and the adaptive coupling of ritual and belief. *Israel Journal of Ecology and Evolution*, 59, 99–108.
- R Core Team (2014). R: A language and environment for statistical computing. R. Foundation for Statistical Computing, Vienna, Austria. URL: <http://www.R-project.org/>.
- Rappaport, R. A. (1999). *Ritual and Religion in the Making of Humanity*. Cambridge: Cambridge University Press.
- Ridley, M. (1996). *The origins of virtue: human instincts and the origins of cooperation*. U.K.: Penguin Books.
- Ruffle, B., & Sosis, R. (2007). Does it pay to pray? Costly ritual and cooperation. *The B.E. Journal of Economic Analysis and Policy*, 7, 1–35 (Article 18).
- Schelling, T. (1960). *The strategy of conflict*. Cambridge, MA: Harvard University Press.
- Schelling, T. (2001). Commitment: Deliberate versus involuntary. In R. Nesse (ed.), *Evolution and the capacity for commitment* (48–56). New York: Russell Sage Foundation.
- Sears, D. O. (1986). College sophomores in the laboratory: Influences of a narrow data base on social psychology's view of human nature. *Journal of personality and social psychology*, 51(3), 515.
- Shaver, J. H., & Sosis, R. (2014). How does male ritual behavior vary across the lifespan? *Human Nature*, 25(1), 136–160.
- Smithson, M., & Verkuilen, J. (2006). A better lemon squeezer? Maximum-likelihood regression with beta-distributed dependent variables. *Psychological Methods*, 11, 54–71.
- Soler, Montserrat. (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 intra-group cooperation: Preliminary results of a comparative analysis of utopian communities. *Cross-Cultural Research*, 34, 70–87.

- Sosis, R. (2003). Why aren't we all Hutterites? Costly signaling theory and religious behavior. *Human Nature, 14*, 91–127.
- Sosis, R. (2005). Does religion promote trust? The role of signaling, reputation, and punishment. *Interdisciplinary Journal of Research on Religion, 1*, 1–30.
- Sosis, R., & Bressler, E. (2003). Cooperation and commune longevity: A test of the costly signaling theory of religion. *Cross-Cultural Research, 37*, 211–239.
- Sosis, R., & Ruffle, B. (2003). Religious ritual and cooperation: Testing for a relationship on Israeli religious and secular kibbutzim. *Current Anthropology, 44*, 713–722.
- Sosis, R., & Ruffle, B. (2004). Ideology, religion, and the evolution of cooperation: field tests on Israeli kibbutzim. *Research in Economic Anthropology, 23*, 89–117.
- Stasinopoulos, D., & Rigby, R. (2007). Generalized additive models for location scale and shape (GAMLSS) in R. *Journal of Statistical Software, 23*, 1–46.
- Tan, J. H., & Vogel, C. (2008). Religion and trust: An experimental study. *Journal of Economic Psychology, 29*, 832–848.
- Tiger, L. (1969). *Men in groups*. New York: Random House.
- West, B., Welch, K., & Galecki, A. (2007). *Linear mixed models: a practical guide using statistical software*. New York: Chapman & Hall/CRC.
- Zahavi, A., & Zahavi, A. (1997). *The handicap principle: A missing piece of Darwin's puzzle*. New York: Oxford University Press.

Appendix A: Model Specification

Self-rated Trust

In Equation 1, y represents self-rated trust to other group members; β_0 is the intercept; other β 's are fixed effects; u_0 represents a random intercept for a group; ϵ is a beta distributed error term; μ is a location parameter; and Φ is a dispersion parameter.

Equation 1: $y = \beta_0 + \beta_1(\text{group type} = \text{club}) + \beta_2(\text{group type} = \text{class}) + \beta_3(\text{sex} = \text{female}) + \beta_4(\text{religiosity}) + u_0 + \epsilon \sim \text{normal}(\mu, \sigma^2)$

Trust Game, Player A

In Equation 2, y represents the amount sent by player A; g is a logit link; β_0 is the intercept; other β 's are fixed effects; u_0 represents a random intercept for a group; ϵ is a beta distributed error term; μ is a location parameter; and Φ is a dispersion parameter.

Equation 2: $g(y) = \beta_0 + \beta_1(\text{group type} = \text{club}) + \beta_2(\text{group type} = \text{class}) + \beta_3(\text{sex} = \text{female}) + \beta_4(\text{religiosity}) + u_0 + \epsilon \sim \text{beta}(\mu, \Phi)$

Trust Game, Player B

In Equation 3, y is the percent returned by Player B to Player A; g is a logit link; β_0 is the intercept; other β s are fixed effects; u_0 represents a random intercept for a group; ε is a beta distributed error term; μ is a location parameter; and Φ is a dispersion parameter.

Equation 3: $g(y) = \beta_0 + \beta_1(\text{group type} = \text{club}) + \beta_2(\text{group type} = \text{class}) + \beta_3(\text{sex} = \text{female}) + u_0 + \varepsilon$ beta (μ, Φ)