



## Religious identity, between-group effects and prosocial behavior: Evidence from a field experiment in China

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### ABSTRACT

Taking an experimental approach, this paper studies the between-group effects of religious identity on social behavior. In this experiment, we recruit Buddhist, Christian, Muslim, and nonbeliever participants in China and sort them into groups based on their religious identities. We use an online field experiment to measure the participants' social behaviors, such as fairness, altruism, trust, and cooperation behaviors, to investigate how they act when they face people with religious identities that are the same as and different from their own. In addition, we employ a questionnaire scale to test the participants' religiosity and to analyze the intrinsic mechanism underlying the relationship between religious identity and social behavior. The results indicate that Chinese Buddhists and Christians do not show obvious ingroup favoritism in the behavioral games; however, Muslims display ingroup favoritism and outgroup discrimination in many of the games. Furthermore, we find that the higher a religious believer's degree of religiosity is, the higher the degree to which they will show favoritism toward an ingroup member in the return behavior of the trust game.

### 1. Introduction

As an ancient and important social phenomenon, religious belief is considered to have two attributes: spirituality and organization (Hoffmann, 2013). Spirituality refers to the ways in which religions profoundly shape people's values, beliefs, and attitudes; organization illustrates how religions play an important role in group identification in a specific society (Ysseldyk, Matheson & Anisman, 2010). As an attribute of religious belief, organization is also an important reason for cultural and even international conflicts around the world. For example, the tremendous divergence in opinion on the Middle East refugee issue between European countries, the never-ending antagonism between Arabic countries and Israel in the Middle East, and the tensions in Kashmir, India, are all related to conflicts related to different religious beliefs.

Religious groups manifest member identity, thereby influencing

individuals' behaviors in social interactions. Social identity is commonly defined as a person's self-perception derived from perceived membership in social groups (Tajfel, 1974). When we belong to a group, we hope to have a sense of identity based on the group. Religions classify people into different groups, and these groups are separate from each other. Moreover, competition in social interaction causes believers to have a closer relationship with and greater love for people who have the same religious identity compared to those belonging to other groups. Believers have a more distant relationship and greater hate for those with different religious identities than for other people. Jackson and Hunsberger (1999) maintain that different religions may lead to bias against others, and Irons (2001) proposes that people with the same religious belief tend to have ingroup favoritism. We hypothesize that people tend to behave with more altruism, fairness, trust, and cooperation toward ingroup members than toward outgroup members, and these patterns can be accurately predicted by people's expectations.

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There are between-group effects among religious groups, and these effects are also affected by religiosity. Religiosity represents people's identification with their religious identity; thus, it can amplify an individual's trust, cooperation and other prosocial behaviors when facing a counterparty with the same religious identity and can intensify an individual's hostility toward people with different religious identities (Farnham, Greenwald & Banaji, 1999; Smurda, Wittig & Gokalp, 2006). In an organization, individuals tend to balance their own views with those of the organization to avoid cognitive incongruence (Bernheim, 1994; Zafar, 2011). Individuals with a stronger sense of identification with the organization have a stronger demand for the organization, and therefore, they display more between-group effects. Thus, we hypothesize that the higher the degree of religiosity that believers have, the greater the likelihood that they will show bias toward ingroup members and discriminate against outgroup members.

Compared to institutionalized Western religions, traditional Chinese religions are mainly diffused religions (Yang, 2007). That is, the boundary between traditional Chinese religions and secular society is blurred, and such religions are inextricably bound up with the secular system and social order. Additionally, most religions in the Western world are monotheistic (e.g., Judaism, Christianity, and Islam) and are explicitly mutually exclusive. However, after spreading to China, due to the country's local politics, culture, and history, these monotheistic religions are practiced significantly differently in China than in the West, where they originated. In particular, Chinese people are also influenced by traditional religions (such as Confucianism and Taoism). For example, after the introduction of Indian Buddhism into China in the late Western Han Dynasty, it evolved with dynasties and merged with Chinese traditional culture, and gradually evolved into the localization of China, and developed the unique feature of Chinese Buddhism. Therefore, the characteristics of mainstream Western religions may have shifted in China, becoming polytheistic or relatively secular religions. Therefore, believers in Western mainstream religions in China may have a weaker sense of belonging and religious piety than Western religious believers, which may further weaken the characteristics of religious believers' pro-social behaviors found in previous literature. We need to study various Chinese religious groups and understand whether there is ingroup favoritism or out-group discrimination related to social behaviors including fairness, altruism, trust, and cooperation and whether individuals' religiosity has an impact on between-group effects.

We conduct an online field experiment that employs a scale for measuring religiosity (comprehensive religiosity and fundamentalist religiosity). Additionally, we recruit believers from the three major religions in China – Buddhism, Christianity, and Islam – as the subjects of the experiment. In the experiment, through the dictator game (Forsythe, Horowitz, Savin & Martin, 1994), ultimatum game (Güth, Schmittberger & Schwarze, 1982), trust game (Berg, Dickhaut & McCabe, 1995), and public goods game (Isaac & Walker, 1988), we analyze the between-group effects of religious identity on social behavior, i.e., whether religious believers have different social behaviors toward ingroup members compared with outgroup members and whether such differences can be explained by religiosity.

The rest of this paper is organized as follows: Section 2 provides a literature review. Section 3 describes the experimental design and implementation. Section 4 analyzes the results, including whether between-group effects exist and the factors that affect the between-group effects. Section 5 presents the conclusions.

## 2. Literature review

### (1) Group identity in the lab and social behavior

Our study concerns how identity affects social behavior, which is of considerable importance in psychology and economics. Tajfel, Billig, Bundy and Flament (1971) used a minimal group paradigm to first propose the minimal condition for the biases of ingroup favoritism and outgroup discrimination. Social identity theory was derived from the

motivational and cognitive basis of between-group differentiation (Tajfel & Turner, 1986). This theory indicates that individuals will tend to engage in ingroup and outgroup comparisons, thus creating social boundaries to distinguish intergroup differences (Abrams & Hogg, 1988). Brewer (1999) discussed the relationship between ingroup bias and outgroup discrimination. Akerlof and Kranton (2000) incorporated group identity in psychology into an economic model of behavior. In their study, they applied this model to analyze outgroup discrimination and social exclusion.

More experimental research has examined peoples' social behavior when they face ingroup members and when they interact with outgroup members. Some studies have created group identities in a laboratory environment to test the impact of such identities on subjects' behaviors. For example, Eckel and Grossman (2005) created different team identities in the laboratory through different methods of grouping and motivation and examined the different impacts of different group creation methods on the subjects' cooperative behavior when playing with intragroup and intergroup partners. McLeish and Oxoby (2011) created group identities based on the ranking of subjects' scores on a set of questions and found that proposers showed more fairness to ingroup members than to outgroup members. Chen and Li (2009) created groups in the laboratory based on individuals' preferences for the arts and found that when facing ingroup members – as opposed to outgroup members – the participants demonstrated more fairness, empathy, and cooperation. Espín, Correa and Ruiz-Villaverde, (2019b) found a connection between competitive sentiments against outgroups and ingroup cooperation by randomly organizing students into three-person groups.

### (2) Group identity in the field and social behavior

In addition to creating group identities in the lab, other research has directly introduced group identities in the real world in a field experiment to test the impact of such identities on people's behavior. For example, Bernhard, Fehr and Fischbacher (2006) selected subjects from two different tribes in Papua New Guinea and found that they have ingroup favoritism with regard to sharing behaviors and altruistic punishment. Goette, Huffman and Meier (2006) analyzed the impact of group membership on cooperation in the Swiss army by introducing different rankings and identities. Chuah, Hoffmann, Jones and Williams (2007) used nationalities as group identities, and the results indicated ingroup favoritism of subjects in ultimatum games when they played against ingroup and outgroup opponents separately. Burns (2006) studied the impact of racial identity on behavior in trust games played in South Africa and found a systematic pattern of distrust toward Black partners, even when playing members of their own race. Chuah, Feeny, Hoffmann and Sanjaya (2019) explored the effect of social identity on antisocial preference in Indonesia, and they found that Acehnese participants were more likely to display an antisocial preference when their coparticipant identified as Javanese relative to Acehnese.

However, there was also some null or unclear evidence of ingroup favoritism and outgroup discrimination on social behaviors. Fershtman and Gneezy (2001) examined ethnic discrimination within Israel's Jewish society in trust and dictator games. They found no evidence for ingroup bias and detected systematic mistrust toward men of Eastern origin. Luo, Chen, He and Gao (2019) and Luo and Wang (2020) primed the subjects with their hukou identity before they made decisions in the experiment. The results show that the subjects' offers in the ultimatum game were not affected by the opponents' hukou types when the hukou identities were revealed (Luo et al., 2019). Regardless of their hukou types, subjects showed more trust toward local hukou pupils compared to nonlocal hukou pupils (Luo & Wang, 2020). Espín et al. (2019a) recruited Gitano and non-Gitano participants who played public goods games with punishment in either ethnically homogeneous or ethnically heterogeneous groups. In the homogeneous groups, punishment was commonly used by non-Gitanos. In the heterogeneous groups, however, Gitanos who did not cooperate were punished not only by non-Gitanos but also by other Gitanos.

### (3) Religion and social behavior

The above literature suggests that many social identities may affect behavioral decision-making. Among all social identities, the impact of religion on social behavior is our foremost concern and has been widely discussed (Preston, Ritter & Ivan Hernandez, 2010). Norenzayan et al. (2016a) developed a cultural evolutionary theory of the origins of prosocial religions and applied it to explain how a package of culturally evolved religious beliefs and practices was conducive to large-scale cooperation with coreligionists. Some experimental evidence has also shown the relationship between religion and social behavior. For example, Tan and Vogel's (2008) experimental results of the trust game indicated that investees with a higher degree of religiosity were more trusted by investors and that this was especially true for investors with a higher degree of religiosity. Everett, Haque and Rand (2016) found a positive relationship between religiosity and prosociality when playing with Christian partners versus atheist partners in resource allocation games. Chuah, Gächter, Hoffmann and Tan (2016) proposed that religious identities serve as markers of the nature in the trust game and degree of connectedness between interacting individuals and found that interpersonal similarity in religiosity and affiliation promoted trust through beliefs related to reciprocity.

There are still some insignificant or complex results regarding the relationship between religion and social behavior. Brañas-Garza, Espín and Neuman (2014) tested the relationship between several religion-related variables, such as intensity of religiosity, measured by participation in church services and social behavior, using dictator, ultimatum, and trust games. The main results show that nonreligious individuals made decisions closer to rational selfish behavior in the dictator and the ultimatum games compared to those who affiliate with a religious denomination. However, the subject's behavior in the trust game was not predicted by any of the religion-related variables they used. Johansson-Stenman, Mahmud and Martinsson (2009) conducted questionnaire surveys and trust game experiments among Muslim and Hindu families in Bangladesh and used religious participation (the frequency of attending worship) to measure religiosity. Their results indicated that neither religious identity nor the degree of religiosity had an impact on participants' trust behaviors.

Recent studies have exploited priming methods to introduce religious identity and to more directly examine the impact of religion on social behavior. Benjamin, Choi and Fisher (2016) used a sentence-unscrambling task to prime religious identity in an experiment regarding subjects' identification with their religion and their economic choices. They found that priming caused Protestants to increase their contributions in public goods games, whereas it caused Catholics to decrease their contributions. Rand et al. (2014) investigated the function of religion to promote cooperation by using explicit theological primes. They found that Christian subjects were more likely to cooperate in public good games after reading a Christian passage than a neutral passage. Werner and Graf Lambsdorff (2020) ran dictator, ultimatum and trust game experiments among Muslim and Christian students. They reminded the subjects of conflict by confronting them with counterparties belonging to their ethnic ingroup, an ethnic outgroup, and their religious ingroup and a religious outgroup. The results indicated a strong tendency to allocate less when the religion or ethnicity of the counterparty was known. There was no evidence of discrimination against outgroup members.

### (4) Group effects of religious identity on social behavior

Among all studies on the impact of religion on social behavior, the most relevant studies for this paper address what social behaviors people display when facing counterparties with different religious identities. Many studies have found positive results about the ingroup effect of religious identity on social behavior. Fitzgerald et al. (2012) conducted a computerized trust game to measure trust and reciprocity between people based on political affiliation, religious denomination, and arbitrary identification. They found that people trusted their ingroup members more than outgroup members and trusted religious and

political ingroup members more than arbitrary ingroup members. Using a modified dictator game and questionnaire survey, Bulbulia and Mahoney (2008) found similar ingroup favoritism among religious believers. Gupta, Mahmud, Maitra, Mitra and Neelim (2018) recruited Hindus, Muslims, and nonreligious people in Bangladesh and India as participants and found that when minority group members were investors in the trust game, they displayed ingroup favoritism; when majority group members were investees, they displayed outgroup favoritism. As investors, religious believers displayed more ingroup favoritism than nonbelievers; as investees, nonbelievers showed obvious outgroup favoritism. Chakravarty, Fonseca, Ghosh, Kumar and Marjit (2019) selected villages based on their religious breakdown, i.e., Hindu-dominated villages, Muslim-dominated villages, and villages with a relatively equal proportion of both religious groups, and the results showed that both Muslims' and Hindus' aversion to advantageous inequality declined in mini-dictator games as the probability of facing an out-group member increased.

However, some field experiments on religion have produced null or negative results, suggesting that the group effects of religious identity on social behavior may be more complex than commonly thought. Koopmans and Rebers (2009) conducted public goods games and found evidence of ingroup favoritism based on religious affiliation but found no support for a separate tendency toward outgroup hostility. S. Chakravarty, Fonseca, Ghosh and Marjit (2016) implemented a simplified version of the Tullock contest to investigate the impact of religious identity by comparing the behaviors of Hindu and Muslim subjects when playing with ingroup members vs. players from the other religion. They found that the effect of social identity was small and inconsistent across the two religious groups. Johansson-Stenman et al. (2009) found no significant intergroup effect between Hindus and Muslims in a trust experiment in terms of investment or return. However, the survey responses indicated that both Hindus and Muslims trusted people from their own religion more than they trusted partners from other religions. The results from the trust games experiment conducted by Chuah, Fahoum and Hoffmann (2013) with residents of Mumbai showed that Hindus and Muslims discriminated against each other. As investors, both Hindus and Muslims showed ingroup favoritism; however, as investees, they did not display ingroup favoritism. S. Chakravarty, Fonseca, Ghosh and Marjit (2016) studied the role of religious fragmentation in intra- and intergroup cooperation through prisoners' dilemma game in India. They conducted ingroup/ingroup treatments in which Muslim subjects and Hindu subjects played with subjects similar to themselves; they also implemented ingroup/outgroup treatments in which Hindu subjects played with Muslim subjects. They found that the effect of religious identity was small and inconsistent across the two religious groups.

Our research is different from the research above, first, in regard to the setting of religious affiliations. In most related studies, religious affiliations are set through questionnaire surveys and are based mainly on the participants' statements. In the present study, we confirm the religious identities of subjects through the combination of the identification of religious leaders and self-reports by the subjects in the questionnaire.

Many previous studies measured the degree of religiosity via the number of religious activities that the participants engaged in each month. We use a multidimensional scale (comprehensive religiosity (Rohrbaugh & Jessor, 1975) and fundamentalist religiosity (Altemeyer & Hunsberger, 1992)) to more accurately and systematically measure subjects' religiosity. Importantly, we employ religiosity as an intrinsic mechanism of the impact of religious identity on social behavior.

As another contribution, we conduct various behavioral games, including the dictator, ultimatum, trust and public goods games, to investigate the relationship between religious attributes and different kinds of social behaviors. Additionally, we collect data on the beliefs of participants with regard to their counterparties' social behavior, and we examine the intergroup effect of religiosity on expected social behavior.

Finally, prior experiments on ingroup bias or outgroup discrimination based on religious identity have been carried out in countries where

religion prevails and there has been an intense conflict between different religions, such as India, Bangladesh, and countries in the West. However, there is little experimental evidence on other countries in which religion is alienated from mainstream culture and there is religious diversity, especially in China, where during the feudal period, various religions were damaged and controlled by imperial powers. In the present study, we focus on the religious identity and social behavior of believers in China, where the religious development and current characteristics are very different from those of other countries.

### 3. Experimental design

#### (1) Experimental subjects

The experiment was carried out in May 2017, and the subjects were sorted into four groups: Chinese Buddhists, Christians, Muslims, and religious nonbelievers. By distributing leaflets in the community and confirming information with religious leaders, we recruited participants from all four groups. We left telephone numbers on the leaflets, and potential participants were able to contact us to participate via phone. To avoid interference with the experimental results due to offline group features, such as the clothes and language of different religious groups, we implemented online field experiments via Sojump<sup>1</sup> (an online crowdsourcing platform in mainland China that provides functions equivalent to Amazon's Mechanical Turk, <https://www.wjx.cn/>) to conduct experiments.

The experimenter sent a Sojump link for the identity confirmation form via WeChat (an internet platform for social interaction) and asked the subjects to complete the form. In addition to options for religious beliefs ("Do you consider yourself to belong to a religious denomination, and if so, which one?"), this form also included topics related to history, philosophy, economics, society, and other issues. The purpose was to avoid having the subjects guess the intention of the experiment, which would affect the results of the experiment. Asking the subjects to complete this form served to confirm their religious identities.

#### (2) Experimental procedure

All participants who confirmed their religious identities received experimental instructions from the experimenter via WeChat to ensure that each subject understood the contents and operation of the experiment; additionally, the experimenter provided control questions for the experimental subjects mainly to help them better understand the payment calculation in the experiment. Only subjects who passed the control test could participate in the formal experiment. We set several control questions. If a subject answered the first question incorrectly, the correct answer and explanation were displayed, and another control question appeared until the subject answered the control question correctly. After the control questions were completed, the Sojump link for the formal experiment was sent by the experimenter via WeChat.

Before the formal experiment began, the experimenter informed the WeChat groups that the subjects could not communicate with one another via WeChat for the entire duration of the experiment. The experimenter also informed the participants of the anonymity of the entire experimental process; that is, the experimental subjects would be completely anonymous throughout the entire experimental process. Although the experimenter could obtain the WeChat ID of the participants by logging in via the Sojump link on WeChat, the experiment did not record the subjects' WeChat IDs, and the subjects' personal information and decision information did not have any connection with the

<sup>1</sup> Sojump has 2.6 million nationwide registered members. There have been many previous works that used Sojump to collect experimental data published, these studies included the topics of risk preferences (She et al., 2017), investor behavior (Wang et al., 2019), consumers' brand identification (He et al., 2017), product demand (Gong et al., 2017) and heterogeneous consumer preferences (Wu et al., 2020). In addition, Li et al. (2017) provided a reliable evaluation of the use of online crowdsourcing platforms for survey research in China.

**Table 1**

Settings for the experiment treatments.

Treatments	Religious identities	Matching	No.
Treatment 1	Disclosure	Buddhist-Buddhist	20
Treatment 2	Disclosure	Buddhist-Christian	20
Treatment 3	Disclosure	Buddhist-Muslim	20
Treatment 4	Disclosure	Buddhist-Nonbeliever	20
Treatment 5	Disclosure	Christian-Christian	20
Treatment 6	Disclosure	Christian-Muslim	20
Treatment 7	Disclosure	Christian-Nonbeliever	20
Treatment 8	Disclosure	Muslim-Muslim	20
Treatment 9	Disclosure	Muslim-Nonbeliever	20
Treatment 10	Disclosure	Nonbeliever-Nonbeliever	20
Treatment 11	Private	Buddhist-Nonbeliever	20
Treatment 12	Private	Christian-Nonbeliever	20
Treatment 13	Private	Muslim-Nonbeliever	20
Treatment 14	Private	Nonbeliever-Nonbeliever	20

Note: In the experiment, the participants consider the strategic decisions when playing both roles; namely, a participant plays the role of player 1 and player 2. "Disclosure" means the situation that the religious identities of both sides in the game were revealed. "Private" means the situation that the participants' religious identities were not disclosed in the experimental process.

IDs provided.

To prevent the subjects from modifying previous answers when they saw subsequent questions, the decision pages were designed so that the subjects could not return to previous pages but could only turn to the next page. After all subjects completed the decision pages on the behavioral games and submitted them, the experimenter sent the survey questionnaire, which included religiosity and demographic information, for all subjects to fill out. After the questionnaires were completed and submitted, the experimenter announced the end of the experiment in the WeChat groups. Then, another experimenter entered the questionnaire website, collected the data, and randomly matched the data of the two groups to generate the final experimental earnings of each person. These earnings were paid to each subject via WeChat account transfer.

#### (3) Experimental settings

Buddhists, Christians, and Muslims whose religious identities were confirmed and who passed the control test were randomly selected until each group included 60 people. The 60 people in each group were again divided into six subgroups, with 10 people in each group; there were a total of 18 groups of followers of the three religions, for a total of 180 people. One hundred people who were religious nonbelievers were retained, and they were also divided into 10 groups of 10 people per group. Thus, there were 280 people in the entire subject group, forming a total of 28 groups of 10 people per group. Additionally, 28 new WeChat groups were established for these 28 groups. The 28 WeChat groups were combined pairwise to form 14 matched experimental groups of 20 people each to perform the behavioral game experiments. We combined 20 participants in pairs to form 10 experimental treatments. Each treatment had 20 participants. The participants in these 10 experimental treatments participated in an experiment in which the religious identity of both sides in the game was revealed. After the participant clicked the link to enter the decision interface, the religious identity information of the two sides of the game was displayed at the top of the page. Another eight WeChat groups were paired in the following way to form four experimental treatments. The participants' religious identities in these four experimental treatments were not disclosed in the experimental process. In total, the experiment had 14 experimental treatments, with each treatment consisting of two experimental groups and 20 subjects.

We used this grouping method and sent Sojump links to different WeChat groups to ensure that we could distinguish the religious identity and the role played in the game of each participant without recording the WeChat ID of the participants. The participants in the groups clicked on the links shared by the experimenter in the WeChat groups to enter the Sojump platform, and they independently made strategic game

**Table 2**  
Demographic information for the experimental subjects.

Variables	Buddhists		Christians		Muslims		Non followers		Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Gender	0.45	0.50	0.42	0.42	0.47	0.50	0.43	0.50	0.44	0.49
Age	40.00	8.18	38.00	10.28	36.83	10.47	36.32	9.99	37.58	9.85
Education	3.30	0.96	3.62	1.06	3.07	0.91	3.43	0.78	3.26	0.98
Income	2.78	1.43	2.98	1.31	2.53	1.10	2.73	0.88	2.52	1.25
Marriage	0.73	0.45	0.72	0.48	0.78	0.34	0.75	0.44	0.75	0.43
No.	60		60		60		100		280	

Note: Gender=1 means “female”, and gender=0 means “male”; education=1 means “primary school or below”, education=2 means “junior high school”, education=3 means “high school”, education=4 means “undergraduate”, and education=5 means “graduate or above”; income=1 means “annual income of 10–60 thousand CNY”, income=2 means “annual income of 60–120 thousand CNY”, income=3 means “annual income of 120–200 thousand CNY”, income=4 means “annual income of 200–300 thousand CNY”, and income=5 means “annual income of 300 thousand CNY or more”; and marriage=1 means “married”, and marriage=0 means “unmarried”.

decisions. Their game partners were participants in another WeChat group, but they did not know who would be paired with them.

The details of the experimental treatments are shown in Table 1. Our payment scheme included paying for the outcome of every game decision made. The experiment lasted approximately 1.5 h, and on average, each subject received compensation of CNY 65.

#### (4) Behavioral game

The experimental decisions were divided into four parts and included a total of 11 questions. These questions involved the dictator game, ultimatum game, trust game and public goods game. Facing a limited sample of religious believers and randomization would leave very few observations per order cell, we used the fixed order of games for all treatments to avoid interference with the treatment effect due to different game orders across the treatments, although the potential spillovers between games under a fixed game order may occur. The participants needed to make decisions for both roles in the game. After the experiment, the computer randomly determined the role that the participants played in calculating their experimental rewards. To avoid the influence of the setting of both roles on the behavior of the participants (Burks et al., 2003), the subjects were informed that their partners in the game were different when playing the two roles. We also set the participants to not know about subsequent tasks for playing another role when they played one role in the game.

#### (5) Religiosity questionnaire

A questionnaire was used to measure the participants' religiosity. This study employed Rohrbaugh and Jessor's (1975) Religiosity Scale and the Religious Fundamentalism Scale of Altemeyer and Hunsberger (1992). The Religiosity Scale of Rohrbaugh and Jessor (1975) comprehensively measures participants' religiosity via religious knowledge, religious beliefs, religious practices, religious experiences, and religious effects. Religious knowledge concerns familiarity with religious knowledge; religious beliefs involve the individual's commitment to a certain religious principle and doctrine; religious practices include organized worship, prayer, religious scriptural study, and observation of the moral and ethical precepts related to the religion believed in; religious experiences refer to various miracles and mysterious personal experiences; and religious effects include peace of mind, a calm character, moral compliance and other behavioral influences that are a result of faith. For example, in the Appendix, questions 1–2 address religious beliefs; questions 3–4 examine religious practices; questions 5–6 concern religious experiences; and questions 7–8 address religious effects. This scale is considered appropriate for analyzing multireligious samples. The questions in the Religious Fundamentalism Scale of Altemeyer and Hunsberger (1992) concern views about other religions, and therefore, the scale is also considered appropriate for cross-religion studies (Hunsberger, 1996).

## 4. Results

In this section, we analyze the data related to the participants'

decision-making in the dictator game, ultimatum game, trust game, and public goods game. The analysis focuses on the behavioral differences in various religious groups when they face ingroup and outgroup members in the game, as well as the factors that cause these differences. To investigate the *ingroup favoritism* of believers, we compare the participants' decisions when they know that their counterparties have the same religious identity as their own with the decisions made when they do not know the religious identity of their counterparties. At the same time, we compare the decisions when participants know that their counterparties have a religious identity that is different from their own with the participants' decisions when the religious identity of their counterparties is unknown to test the *outgroup discrimination* of believers. We also analyze the *intergroup effect* of religious identity on social behavior by comparing the difference between ingroup and outgroup outcomes.

Table 2 shows the descriptive statistics for the demographic features of all subjects. In general, the mean age of the experimental subjects was 37.58 years, 56% were male, the average educational level was college or above, the annual family income was CNY 60,000 to 120,000, and 75% were married. When we were recruiting people from different religions and those who did not follow a religion, we controlled as much as possible the differences among the different groups in terms of primary individual characteristics such as gender, age, educational level, annual family income, and marital status. Specifically, there were no significant differences between the groups with different religious beliefs and those who did not follow a religion in terms of gender, age, and marital status (Kruskal-Wallis test, gender:  $\chi^2 = 3.026, p = 0.453$ ; age:  $\chi^2 = 4.271, p = 0.234$ ; marital status:  $\chi^2 = 5.617, p = 0.189$ ). In terms of educational level and annual family income, there were no significant differences between Buddhists, Christians, and those who did not follow a religion (educational level:  $\chi^2 = 4.162, p = 0.295$ ; annual family income:  $\chi^2 = 5.126, p = 0.217$ ). Muslims had a significantly lower educational level and annual family income than other groups (education: Muslim vs. Buddhists,  $p < 0.0831$ ; Muslim vs. Christians,  $p < 0.0125$ ; Muslim vs. nonfollowers,  $p < 0.0523$ ; family income: Muslim vs. Buddhists,  $p < 0.0722$ ; Muslim vs. Christians,  $p < 0.0164$ ; Muslim vs. nonfollowers,  $p < 0.0872$ ), and the results are consistent with the data from the Chinese General Social Survey (CGSS, 2017).

### 4.1. Results of the dictator game

In this experiment, we asked the subjects to indicate the amount of money that they were willing to allocate to the other player of the game and to guess the amount that the other player, as the dictator, was willing to allocate to them. Thus, two pieces of data were created: the allocation amount and the expected allocation amount. The allocation amount reflects the participant's degree of altruism, while the expected allocation amount reflects the participant's judgment of the other party's altruism.

(1) Nonparametric tests of the allocation and expected allocation amounts

**Table 3**  
The difference test for allocation amounts and expected allocation amounts.

		Buddhists	Christians	Muslims	Non-believers
In-group	Allocation	9.40 (1.43)	8.55 (2.78)	8.35 (2.80)	8.55 (2.69)
	Expected allocation	8.95 (1.85)	9.80 (5.17)	8.05 (5.01)	8.30 (5.27)
Out-group	Allocation	9.58 (1.43)	9.40 (1.48)	8.73 (2.23)	9.30 (1.73)
	Expected allocation	10.77 (5.22)	8.80 (4.35)	8.40 (2.95)	9.90 (4.38)
Unknown identities	Allocation	9.50 (1.27)	9.50 (1.58)	8.70 (2.16)	8.34 (3.19)
	Expected allocation	10.60 (4.40)	8.40 (2.67)	11.70 (6.02)	8.54 (3.87)
In-group vs. Out-group	Allocation	$p = 0.3755$ $d = 0.1259$	$p = 0.3639$ $d = 0.3817$	$p = 0.7878$ $d = 0.1501$	$p = 0.2860$ $d = 0.3316$
	Expected allocation	$p = 0.3144$ $d = 0.4648$	$p = 0.6622$ $d = 0.2093$	$p = 0.4005$ $d = 0.0851$	$p = 0.1548$ $d = 0.3302$
	Allocation	$p = 0.9498$ $d = 0.0739$	$p = 0.3439$ $d = 0.4202$	$p = 0.8279$ $d = 0.1400$	$p = 0.9008$ $d = 0.0712$
	Expected allocation	$p = 0.1259$ $d = 0.4798$	$p = 0.4889$ $d = 0.6690$	$p = 0.6591$ $d = 0.9538$	$p = 0.0519$ $d = 0.1712$
Out-group vs. Unknown	Allocation	$p = 0.4798$ $d = 0.0592$	$p = 0.6690$ $d = 0.0653$	$p = 0.9538$ $d = 0.0137$	$p = 0.1712$ $d = 0.3741$
	Expected allocation	$p = 0.9339$ $d = 0.0346$	$p = 0.9017$ $d = 0.1108$	$p = 0.4019$ $d = 0.6961$	$p = 0.5387$ $d = 0.3291$

Note: The values in the parentheses are the standard deviation. The  $p$  values were calculated by the Mann-Whitney test. The effect size (Cohen's  $d$  value) was also reported.

We first employed nonparametric tests to examine whether allocations and expected allocations differ when the counterparty in the game was from an ingroup, from an outgroup or from an unknown religious group. The results are displayed in Table 3. The participants' allocation and expected allocation amounts did not differ, independent of whether the other party's identity was the same as or different from the participant's identity. Furthermore, no ingroup or outgroup effects were identified: in comparison with the results when the other party in the game was unknown, the subjects did not indicate higher allocation amounts or expected allocation amounts when the other party in the game had the same religious identity as that of the participant; similarly, the participants did not show lower allocation amounts or expected allocation amounts when the other party's identity was different from that of the participant. The above conclusions hold true for all the groups tested, namely, Buddhists, Christians, Muslims, and nonbelievers.

**Table 4**  
OLS regression results for factors affecting allocation amounts.

	(1)	(2)	(3)	(4)	(5)
Outgroup	0.58 (0.33)	0.45 (0.35)	0.067 (0.51)	-0.10 (0.74)	0.033 (0.88)
Ingroup	-0.038 (0.36)	-0.086 (0.38)	-0.10 (0.54)	-0.95 (0.79)	-0.35 (0.94)
Buddhist		0.75* (0.39)			
Christian		0.38 (0.39)			
Muslim		-0.15 (0.39)			
Constant	8.68***(0.26)	8.55***(0.28)	9.50***(0.44)	9.50***(0.64)	8.70***(0.77)
N	280	280	60	60	60

Note: \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and standard errors are reported in parentheses. The regression results for the allocation amounts by Buddhists, Christians, and Muslims respectively in the columns (3) – (5).

We also performed further tests of between-group effects based on different religious identities to ascertain whether the allocation and expected allocation amounts differed when a participant faced two counterparties with different religious identities and when two participants with different religious identities faced counterparties with the same religious identity. The test results are shown in Appendix Table 1 and Appendix Table 2. The test results indicate that other than a few that exceeded the 10% significance level using pairwise comparisons, the results for most pairs are not significantly different.

The results of the nonparametric tests of various dimensions indicate that in terms of altruistic behavior and expected altruistic behavior, religious identity did not cause ingroup or outgroup effects. In other words, in the dictator game, participants with a given religious identity did not behave differently toward their counterparties in the game, regardless of whether they had the same or a different religious identity.

(2) Analysis of factors affecting the allocation amounts

Furthermore, we considered more factors and more comprehensively analyzed whether the participants' allocation amounts had ingroup and outgroup effects. Table 4 presents the results of ordinary least squares (OLS) regression analysis on the allocation amounts. In Model (1), the baseline group is the sample of coplayers with unknown religious identities. The Outgroup variable captures the comparison of the different religious identities of the two players in the condition where the coplayer's identity is known versus the condition where religious identities are unknown. The Ingroup variable indicates the comparison of the same religious identities of the two players in the condition where player identity is known versus the condition where religious identities are unknown. Model (2) includes three dummy variables, Buddhist, Christian, and Muslim, to test the impact of the participants' religious identity on the allocation amounts. We also analyzed the between-group effect of religious identity on the allocation amounts by testing the difference between the Outgroup and Ingroup variables (Full sample:  $F = 2.13, p = 0.1460$ , partial  $\eta^2 = 0.396$ ). The regression results indicate that only Buddhists differ from nonbelievers in terms of allocations: Buddhists allocate more than nonbelievers, albeit this difference is only marginally significant. Moreover, we used the F-test to compare the coefficients of the religious groups and found that Buddhists allocate more amounts than Muslims ( $F = 2.56, p = 0.0685$ , partial  $\eta^2 = 0.691$ ).

To further analyze whether a group of people with a specific religious identity have ingroup and outgroup outcomes, we performed regression analyses on the allocation amounts of the Buddhist, Christian, and Muslim participants (Table 4, columns (3)-(5)). The regression results for the subsamples indicate that the coefficients of the variables are not significant.

We also incorporated comprehensive religiosity and fundamentalist religiosity into the model to analyze the factors affecting the allocation amounts (Table 5). In accordance with Tan (2006), we converted the scores on the Religiosity Scale completed by the participants into standardized scores. As discussed above, the Religiosity Scale comprehensively measures participants' religiosity via knowledge, beliefs, practices, experiences, and effects; the Fundamentalism Scale focuses more on measuring participants' fundamentalist beliefs, as embodied by complete identification with and strict adherence to religious beliefs.

**Table 5**  
Impacts of religiosity on allocation amounts.

	(6)	(7)	(8)	(9)	(10)	(11)
Outgroup	0.60 (0.33)	0.60 (0.33)	0.60 (0.34)	0.58 (0.33)	0.56 (0.34)	0.58 (0.33)
Ingroup	0.01 (0.36)	-0.00 (0.36)	0.01 (0.36)	0.014 (0.36)	0.00 (0.35)	-0.00 (0.36)
Reli	0.56 (0.27)	0.59 (0.55)	0.58 (0.54)			
Fund				0.38 (0.42)	-0.12 (1.00)	-0.067(0.95)
Reli × Outgroup		-0.21 (0.69)	-0.20 (0.68)			
Reli × Ingroup		0.16 (0.71)	0.15 (0.70)			
Fund × Outgroup					0.25 (0.94)	0.27 (1.13)
Fund × Ingroup					0.84 (0.22)	0.92 (1.19)
Individual characteristics control	No	No	Yes	No	No	Yes
Constant	8.67***(0.25)	8.68***(0.25)	9.07***(0.25)	8.68***(0.26)	8.67***(0.26)	9.07***(0.81)
N	280	280	280	280	280	280

Note: \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and standard errors are reported in parentheses.

**Table 6**  
The difference test for proposed amounts and expected proposed amounts.

		Buddhists	Christians	Muslims	Non-believers
In-group	Proposed	10.65 (3.44)	9.50 (3.69)	10.40 (5.74)	11.05 (5.28)
	Expected proposed	9.05 (3.33)	7.25 (3.14)	8.65 (4.69)	8.95 (3.52)
Out-group	Proposed	11.57 (3.51)	10.97 (3.94)	10.33 (3.99)	10.30 (3.48)
	Expected proposed	9.50 (3.42)	9.43 (3.94)	7.90 (2.80)	8.60 (3.39)
Unknown identities	Proposed	12.40 (5.08)	11.50 (3.38)	12.10 (5.32)	8.98 (3.72)
	Expected proposed	9.30 (2.41)	7.90 (3.51)	9.40 (4.29)	7.78 (3.11)
In-group vs. Out-group	Proposed	$p = 0.7042$ $d = 0.2647$	$p = 0.4019$ $d = 0.4036$	$p = 0.9823$ $d = 0.0142$	$p = 0.8112$ $d = 0.1677$
	Expected proposed	$p = 0.8920$ $d = 0.1333$	$p = 0.1225$ $d = 0.6119$	$p = 0.8269$ $d = 0.1942$	$p = 0.9345$ $d = 0.1013$
In-group vs. Unknown	Proposed	$p = 0.0956^*$ $d = 0.4034$	$p = 0.0869^*$ $d = 0.5652$	$p = 0.2765$ $d = 0.3072$	$p = 0.2568$ $d = 0.4532$
	Expected proposed	$p = 0.9213$ $d = 0.0860$	$p = 0.8216$ $d = 0.1952$	$p = 0.2985$ $d = 0.1669$	$p = 0.3246$ $d = 0.3523$
Out-group vs. Unknown	Proposed	$p = 0.6235$ $d = 0.1901$	$p = 0.7464$ $d = 0.1444$	$p = 0.6638$ $d = 0.3764$	$p = 0.3724$ $d = 0.3665$
	Expected proposed	$p = 0.9459$ $d = 0.0676$	$p = 0.2176$ $d = 0.4101$	$p = 0.3195$ $d = 0.4141$	$p = 0.3456$ $d = 0.2521$

Note: The values in the parentheses are the standard deviation. The  $p$  values were calculated by the Mann-Whitney test. The effect size (Cohen's  $d$  value) was also reported.

The standardized score is also referred to as the Z-score; it is calculated by dividing the difference between the variable value and the average value by the standard deviation, i.e.,  $z = (x - \mu) / \sigma$ , where  $\mu$  is the average value and  $\sigma$  is the standard deviation. The advantage of standardized scores is that the results of the two religiosity scales can be directly compared.

Model (6) adds the comprehensive religiosity variable (Reli) based on Model (1), and Model (9) adds the fundamentalist religiosity variable (Fund). The regression results indicate that Reli and Fund do not have a direct impact on the allocation amounts. Model (8) adds the interactions of Reli with Ingroup and Outgroup to Model (7), and these interactions

are not significant, which suggests that the impact of Ingroup and Outgroup on the allocation amount is not strengthened when we add Reli. Model (10) adds the interactions of Fund with Ingroup and Outgroup to Model (9), and the results are robust. Models (8) and (11) add demographic variables to perform robustness tests.

The regression results of the allocation amounts indicate that there are no religious identities that have ingroup or outgroup outcomes or between-group effects. In addition, the allocation amounts of participants are not affected by their comprehensive and fundamentalist religiosity, and religiosity has no interaction effect with religious groups on allocation behavior.

#### 4.2. Results of the ultimatum game

In the experiment, the participants allocated the endowment as proposers, indicated the minimum acceptable offer (MAO) as responders and predicted the amount proposed by their counterparties. Therefore, the experiment generated three sets of data: the proposed amounts, the expected proposed amounts, and the MAOs. We can use the data on proposed amounts to represent subjects' altruistic or strategic selfish preference and use MAOs to measure the fairness of individuals. The expected proposed amount is the subject's judgment about the counterparty's altruistic or strategically selfish motives.

##### (1) Nonparametric tests of the proposed and expected proposed amounts

We performed nonparametric tests to examine whether the proposed amounts and expected proposed amounts differ when the counterparty in the game is from an ingroup, from an outgroup or from an unknown religious group (see Table 6). We sorted the participants' proposed amounts and expected proposed amounts based on the counterparties' religious identity – the same as the participants' religious identity, different from the participants' religious identity, or unknown. The test results indicate that when facing counterparties in the game who have the same religious identities as their own, Buddhists' proposed amounts are significantly lower than those when they do not know their counterparties' religious identity. This result also holds true for Christians. The ingroup and outgroup effects on the proposed amounts and expected proposed amounts of other groups are not significant.

##### (2) Analysis of factors affecting the proposed amounts

We further analyzed the factors affecting the proposed amounts via regression analyses. The results in Table 7 indicate that Buddhists' proposed amounts were significantly higher than those of other groups. Although we do not find outgroup discrimination (different religious identity known vs. unknown) or ingroup bias (same religious identity known vs. unknown), when their counterparties were ingroup members, Buddhists and Christians proposed significantly lower amounts than they do when their counterparties were outgroup members (between-group effect of Buddhists:  $F = 2.35$ ,  $p = 0.0872$ , partial  $\eta^2 = 0.653$ ; between-group effect of Christians:  $F = 2.68$ ,  $p = 0.0526$ , partial  $\eta^2 = 0.725$ ).

**Table 7**  
OLS regression results for factors affecting proposed amounts.

	(1)	(2)	(3)	(4)	(5)
Outgroup	0.50 (0.60)	0.083 (0.63)	0.83 (1.38)	0.53 (1.38)	-2.97 (1.77)
Ingroup	0.16 (0.66)	-0.26 (0.69)	-1.75 (1.46)	-2.00 (1.46)	-2.70 (1.88)
Buddhist		1.63** (0.71)			
Christian		0.79 (0.71)			
Muslim		0.94 (0.71)			
Constant	10.23***(0.47)	9.82***(0.51)	12.40***(1.20)	11.50***(1.19)	13.10***(1.54)
N	280	280	60	60	60

Note: \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and standard errors are reported in parentheses. The regression results for the allocation amounts by Buddhists, Christians, and Muslims respectively in the columns (3) – (5).

**Table 8**  
Impacts of religiosity on proposed amounts.

	(6)	(7)	(8)	(9)	(10)	(11)
Outgroup	0.52 (0.60)	0.52 (0.60)	0.51 (0.61)	0.51 (0.60)	0.49 (0.61)	0.50 (0.61)
Ingroup	0.14 (0.66)	0.18 (0.60)	0.20 (0.61)	0.14 (0.66)	0.14 (0.67)	0.18 (0.61)
Reli	0.33 (0.49)	1.33 (1.00)	1.54 (1.22)			
Fund				0.38 (0.77)	1.32 (1.74)	1.35 (1.83)
Reli × Outgroup		-1.18 (1.27)	-1.27 (1.13)			
Reli × Ingroup		-1.50 (1.30)	-1.24 (1.51)			
Fund × Outgroup					-1.13 (2.08)	-1.24 (1.70)
Fund × Ingroup					-1.21 (2.17)	-1.32 (2.20)
Individual characteristics control	No	No	Yes	No	No	Yes
Constant	10.2***(0.47)	10.2***(0.47)	12.3***(1.47)	10.2***(0.47)	10.3***(0.47)	12.4***(1.47)
N	280	280	280	280	280	280

Note: \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and standard errors are reported in parentheses.

**Table 9**  
The difference test for MAOs.

	Buddhists	Christians	Muslims	Non-believers
In-group MAOs	4.60 (4.16)	5.00 (3.91)	6.15 (5.63)	7.05 (4.42)
Out-group MAOs	6.47 (4.72)	6.27 (5.32)	6.70 (3.55)	5.90 (3.75)
Unknown identities MAOs	5.20 (3.46)	6.50 (3.87)	9.60 (6.88)	6.98 (3.08)
In-group vs. Out-group MAOs	$p = 0.0826^*$ $d = 0.4203$	$p = 0.6462$ $d = 0.2720$	$p = 0.929$ $d = 0.1169$	$p = 0.5413$ $d = 0.2806$
In-group vs. Unknown MAOs	$p = 0.3394$ $d = 0.1568$	$p = 0.0813^*$ $d = 0.1568$	$p = 0.0412^{**}$ $d = 0.5488$	$p = 0.8213$ $d = 0.0184$
Out-group vs. Unknown MAOs	$p = 0.2543$ $d = 0.3069$	$p = 0.8126$ $d = 0.0494$	$p = 0.1564$ $d = 0.5297$	$p = 0.2789$ $d = 0.3147$

Note: The values in the parentheses are the standard deviation. The  $p$  values were calculated by the Mann-Whitney test. The effect size (Cohen's  $d$  value) was also reported.

**Table 10**  
OLS regression results for factors affecting MAOs.

	(1)	(2)	(3)	(4)	(5)
Outgroup	-0.69 (0.62)	-0.61 (0.66)	1.27 (1.59)	-0.23 (1.71)	-2.90 (1.81)
Ingroup	-1.33* (0.68)	-1.25* (0.71)	-0.60 (1.69)	-1.50 (1.81)	-3.45* (1.92)
Buddhist		-0.75 (0.73)			
Christian		-0.50 (0.73)			
Muslim		0.62 (0.73)			
Constant	7.03***(0.48)	7.10***(0.53)	5.20***(1.38)	6.50***(1.48)	9.60***(1.56)
N	280	280	60	60	60

Note: \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and standard errors are reported in parentheses. The regression results for the allocation amounts by Buddhists, Christians, and Muslims respectively in the columns (3) – (5).

We also considered the impact of the participants' religiosity on the proposed amounts (Table 8). A review of the coefficients indicates that the impact of fundamentalist religiosity has the same direction as that of comprehensive religiosity. In terms of the coefficients of interaction effects, these two variables for religiosity are both negatively correlated with the proposed amounts for both ingroup and outgroup members.

(3) Nonparametric tests of the MAOs

Table 9 presents the descriptive statistics and test results for participants with various religious identities when they faced ingroup, outgroup, and anonymous counterparties in the game. The results indicate that Christians, and Muslims had significantly lower MAOs when they face counterparties from their own religious groups compared to when they did not know their counterparties' religious identities. In addition, Buddhists had significantly lower MAOs when they face counterparties from their own religious groups compared to when they face counterparties from different religious identities. These results indicate that members of the above religious groups were more tolerant of "their own people" than of "others."

(4) Analysis of factors affecting the MAOs

The regression results in Table 10 show that the Ingroup coefficients in the model (1) and (2) are significantly negative. It also shows that the Ingroup coefficient in the model (5) for Muslims is significantly negative, which is consistent with the nonparametric test result; in other



**Table 11**  
Impacts of religiosity on MAOs.

	(6)	(7)	(8)	(9)	(10)	(11)
Outgroup	-0.73 (0.62)	-0.77 (0.62)	-0.74 (0.62)	-0.70 (0.62)	-0.74 (0.62)	-0.72 (0.62)
Ingroup	-1.29* (0.68)	-1.29* (0.68)	-1.26* (0.68)	-1.26* (0.68)	-1.32* (0.69)	-1.28* (0.68)
Reli	-0.71 (0.51)	0.83 (1.03)	0.75 (0.86)			
Fund				-0.98 (0.79)	-0.039 (1.79)	-0.036 (1.69)
Reli × Outgroup		-2.73* (1.30)	-2.52* (1.22)			
Reli × Ingroup		-1.28 (1.33)	-1.20 (1.15)			
Fund × Outgroup					-2.00 (2.14)	-1.83 (2.03)
Fund × Ingroup					-0.094 (2.24)	-0.12 (2.36)
Individual characteristics control	No	No	Yes	No	No	Yes
Constant	7.03***(0.48)	7.02***(0.48)	7.20***(0.48)	7.01***(0.48)	7.02***(0.48)	7.02***(0.48)
N	280	280	280	280	280	280

Note: \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and standard errors are reported in parentheses.

**Table 12**  
The difference test for investment amounts and expected investment amounts.

		Buddhists	Christians	Muslims	Non-believers
In-group	Investment	12.25 (4.78)	10.35 (5.04)	12.00 (5.27)	10.60 (4.21)
	Expected investment	9.85 (5.13)	8.45 (4.98)	11.50 (4.93)	10.05 (4.96)
Out-group	Investment	12.57 (4.65)	12.50 (4.83)	9.73 (3.43)	11.20 (4.33)
	Expected investment	10.13 (4.77)	9.80 (4.14)	8.40 (3.78)	8.90 (4.20)
Unknown identities	Investment	15.30 (4.27)	12.30 (5.54)	12.30 (4.97)	10.18 (1.08)
	Expected investment	10.10 (1.52)	9.20 (6.46)	11.20 (5.98)	9.04 (4.13)
In-group vs. Out-group	Investment	$p = 0.9721$ $d = 0.0679$	$p = 0.3392$ $d = 0.4356$	$p = 0.2095$ $d = 0.5105$	$p = 0.8845$ $d = 0.1405$
	Expected investment	$p = 0.9778$ $d = 0.0565$	$p = 0.6310$ $d = 0.2948$	$p = 0.056^*$ $d = 0.7057$	$p = 0.6554$ $d = 0.2502$
	Investment	$p = 0.0897^*$ $d = 0.6730$	$p = 0.2156$ $d = 0.3682$	$p = 0.9263$ $d = 0.0586$	$p = 0.8756$ $d = 0.1367$
	Expected investment	$p = 0.9523$ $d = 0.0396$	$p = 0.9026$ $d = 0.1300$	$p = 0.8964$ $d = 0.0547$	$p = 0.7856$ $d = 0.2213$
Out-group vs. Unknown	Investment	$p = 0.2058$ $d = 0.6116$	$p = 0.9568$ $d = 0.0385$	$p = 0.1156$ $d = 0.6019$	$p = 0.6524$ $d = 0.3232$
	Expected investment	$p = 0.9953$ $d = 0.0085$	$p = 0.8569$ $d = 0.1106$	$p = 0.078^*$ $d = 0.5597$	$p = 0.9945$ $d = 0.0336$

Note: The values in the parentheses are the standard deviation. The  $p$  values were calculated by the Mann-Whitney test. The effect size (Cohen's  $d$  value) was also reported.

words, Muslims had a lower requirement for fairness for ingroup members compared to the condition where religious identities were unknown.

We also introduced comprehensive religiosity and fundamentalist religiosity to better explain the participants' MAOs. The regression results show that the coefficients of the Ingroup coefficient remain significantly negative. We also found that interaction term of the Reli and Outgroup variables are negative and significant (see Table 11), which suggests that believers had lower MAOs, albeit not significantly, when they faced outgroup members than when they did not know the religious identities of counterparties, and this tendency was more

obvious with the improvement of their comprehensive religiosities.

### 4.3. Results of the trust game

In the experiment, the subjects, as investors, first chose the investment amount that they were willing to give to investees and predicted the amount that the investees would return, i.e., the returned amount. The participants then acted as investees and indicated the amount that they were willing to return corresponding to each possible amount of money received from the investor, which ranges from CNY 1 to 20. The participants then predicted the amount that the investor would invest. As a result, four sets of data were generated in the trust game – the investment amount, the expected investment amount, the return, and the expected return. The investment amount is an indicator of the participants' trust in others; the expected investment amount is the participants' judgment about others' trust level; the return reflects the participants' trustworthiness – the degree to which they can be trusted; and the expected return is an indicator of the participants' judgment about others' trustworthiness.

#### (1) Nonparametric tests of the investment and expected investment amounts

The investment amount is the amount that the investor gives to the investee in the game; it measures the investor's level of trust in the investee. Table 12 presents the statistical analysis of the investment amount and the comparison test results when Buddhists, Christians, Muslims, and nonbelievers faced ingroup and outgroup counterparties. The results indicate that Buddhists invested significantly lower amounts in ingroup members than in unknown religious identities, and Muslims expected less investments from outgroup members than from ingroup members and unknown religious identities.

#### (2) Analysis of factors affecting the investment amounts

The regression results for investment amounts (Table 13) indicate that Buddhists and Christians had significantly higher investment amounts than did the other groups. Additionally, when the investors were Buddhists, the investors invested significantly lower amounts when the investees were ingroup members than when the investees are from unknown religious groups. Furthermore, Muslims invested significantly more when investees were ingroup members compared to when the investees were from outgroup members (between-group effect:  $F = 3.22, p = 0.0781, \text{partial } \eta^2 = 0.696$ ).

In terms of religiosity, the regression results indicated that the interactions of Ingroup with both Reli and Fund are negative and significant, indicating that when investors faced counterparties from their own religious group, a higher degree of religiosity led to less investment than when the religious identity was unknown (see Table 14).

#### (3) Nonparametric tests of the return and expected return

The rate of return is the proportion of the investment that the investee returns to the investor in the game; it is an indicator of the investor's trustworthiness. Table 15 presents the rates of return when the investees faced ingroup and outgroup members, as well as

**Table 13**  
OLS regression results for factors affecting investment amounts.

	(1)	(2)	(3)	(4)	(5)
Outgroup	0.15 (0.67)	-0.39 (0.69)	-2.73 (1.69)	0.20 (1.83)	-2.57 (1.60)
Ingroup	-0.05 (0.73)	-0.59 (0.75)	-3.05* (1.79)	-1.95 (1.94)	0.30 (1.70)
Buddhist		2.50*** (0.77)			
Christian		1.34* (0.77)			
Muslim		0.50 (0.77)			
Constant	11.35***(0.52)	10.81***(0.56)	15.30***(1.46)	12.30***(1.59)	12.30***(1.38)
N	280	280	60	60	60

Note: \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and standard errors are reported in parentheses. The regression results for the allocation amounts by Buddhists, Christians, and Muslims respectively in the columns (3) – (5).

**Table 14**  
Impacts of religiosity on investment amounts.

	(6)	(7)	(8)	(9)	(10)	(11)
Outgroup	0.19 (0.67)	0.20 (0.67)	0.18 (0.67)	0.16 (0.67)	0.17 (0.67)	0.18 (0.67)
Ingroup	-0.088(0.73)	-0.044(0.73)	-0.02 (0.72)	-0.086(0.73)	-0.064(0.74)	-0.038(0.74)
Reli	0.70 (0.55)	1.21 (1.11)	1.12 (1.03)			
Fund				0.58 (0.85)	0.24 (1.93)	0.20 (1.92)
Reli × Outgroup		-0.20 (1.41)	-0.18 (1.40)			
Reli × Ingroup		-1.18* (1.43)	-1.16* (1.42)			
Fund × Outgroup					0.78 (2.30)	0.75 (2.21)
Fund × Ingroup					-0.021*(2.40)	-0.015*(2.32)
Individual characteristics control	No	No	Yes	No	No	Yes
Constant	11.4***(0.52)	11.3***(0.52)	11.3***(0.52)	11.4***(0.52)	11.4***(0.52)	11.3***(0.52)
N	280	280	280	280	280	280

Note: \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and standard errors are reported in parentheses.

nonbelievers, as investors. The results indicate that when the investors were ingroup and outgroup members, as well as nonbelievers, none of the groups – Christians, Buddhists, Muslims, or nonbelievers – displayed significant differences in the rate of return.

(4) Analysis of factors affecting the rate of return

We further performed a regression analysis on the rate of return (Table 16). The results for the overall sample show that the Buddhist and Muslim variables are significantly positive, indicating that Buddhists and Muslims had a level of trustworthiness that was significantly higher than that of the other groups. The regression results for the subsample of Muslims indicate that the Ingroup variable is positive and significant, indicating that when Muslims faced other Muslims as investors, the rate of return was significantly higher than when they did not know the religious identity of the investors. We also found a between-group effect through an F-test that Muslims had significantly more returns when they faced ingroup investors than when the investors were outgroup members (between-group effect:  $F = 3.16, p = 0.0806, \text{partial } \eta^2 = 0.672$ ).

We further considered the impact of religiosity on the rate of return (Table 17). The regression results show that the interaction of Reli and Ingroup is positive and significant, indicating that when the participants knew that their counterparties' religious identity was the same as theirs, a higher degree of comprehensive religiosity increased the rate of return. Fund has a significantly negative impact on the rate of return; furthermore, the interaction of Fund with Outgroup is significantly negative, and the interaction of Fund and Ingroup is significantly positive. Therefore, when participants faced ingroup members in the game, the higher the degree of the subjects' fundamentalist religiosity was, the higher the rate of return. Additionally, when participants faced outgroup counterparties, the higher the degree of the subjects' fundamentalist religiosity was, the lower the rate of return.

4.3. Results of the public goods game

(1) Nonparametric tests of the contribution and expected contribution amounts

The contribution amount is the amount that participants contribute to the public project, and it is an indicator of the participants' level of

**Table 15**  
The difference test for return and expected return.

		Buddhists	Christians	Muslims	Non-believers
In-group	Return	0.71 (0.18)	0.52 (0.19)	0.68 (0.24)	0.61 (0.28)
	Expected return	0.86 (0.27)	0.90 (0.19)	0.95 (0.16)	0.95 (0.15)
Out-group	Return	0.67 (0.25)	0.61 (0.25)	0.58 (0.21)	0.52 (0.27)
	Expected return	0.88 (0.24)	0.92 (0.17)	0.91 (0.21)	0.83 (0.30)
Unknown identities	Return	0.73 (0.27)	0.54 (0.16)	0.60 (0.25)	0.52 (0.19)
	Expected return	0.84 (0.26)	0.88 (0.21)	0.92 (0.18)	0.94 (0.13)
In-group vs. Out-group	Return	$p = 0.8162$ $d = 0.1836$	$p = 0.3735$ $d = 0.4053$	$p = 0.1896$ $d = 0.4435$	$p = 0.3332$ $d = 0.3272$
	Expected return	$p = 0.9702$ $d = 0.0783$	$p = 0.9392$ $d = 0.1109$	$p = 0.7543$ $d = 0.2143$	$p = 0.1396$ $d = 0.5060$
	Return	$p = 0.6524$ $d = 0.0872$	$p = 0.8963$ $d = 0.1139$	$p = 0.4029$ $d = 0.3265$	$p = 0.3287$ $d = 0.3761$
	Expected return	$p = 0.9246$ $d = 0.0755$	$p = 0.9312$ $d = 0.0999$	$p = 0.8256$ $d = 0.1762$	$p = 0.9956$ $d = 0.0712$
Out-group vs. Unknown	Return	$p = 0.6582$ $d = 0.2306$	$p = 0.5210$ $d = 0.3335$	$p = 0.9015$ $d = 0.0866$	$p = 0.9985$ $d = 0.000$
	Expected return	$p = 0.7412$ $d = 0.1599$	$p = 0.8069$ $d = 0.2094$	$p = 0.9564$ $d = 0.0511$	$p = 0.1106$ $d = 0.4758$

Note: The values in the parentheses are the standard deviation. The  $p$  values were calculated by the Mann-Whitney test. The effect size (Cohen's  $d$  value) was also reported.

**Table 16**  
OLS regression results for factors affecting return.

	(1)	(2)	(3)	(4)	(5)
Outgroup	-0.032 (0.32)	-0.11 (0.06)	-0.025 (0.08)	0.065 (0.06)	-0.07 (0.05)
Ingroup	0.042 (0.34)	0.041 (0.03)	0.038 (0.07)	-0.088 (0.06)	0.13* (0.08)
Buddhist		0.16*** (0.04)			
Christian		0.023 (0.06)			
Muslim		0.076*** (0.05)			
Constant	0.55***(0.03)	0.53***(0.04)	0.55***(0.04)	0.54***(0.05)	0.58***(0.07)
N	280	280	60	60	60

Note: \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and standard errors are reported in parentheses. The regression results for the allocation amounts by Buddhists, Christians, and Muslims respectively in the columns (3) – (5).

**Table 17**  
Impacts of religiosity on return.

	(6)	(7)	(8)	(9)	(10)	(11)
Outgroup	-0.04 (0.03)	-0.06 (0.03)	0.02 (0.02)	-0.02 (0.03)	-0.01 (0.03)	0.01 (0.05)
Ingroup	0.35 (0.03)	0.048 (0.03)	0.052 (0.04)	0.036 (0.04)	0.035 (0.06)	0.039 (0.07)
Reli	-0.029(0.03)	-0.13 (0.07)	-0.11(0.07)			
Fund				-0.08*(0.04)	-0.24**(0.10)	-0.24**(0.10)
Reli × Outgroup		-0.10 (0.06)	-0.11 (0.06)			
Reli × Ingroup		0.18** (0.09)	0.16** (0.08)			
Fund × Outgroup					-0.15*(0.09)	-0.18* (0.09)
Fund × Ingroup					0.24** (0.12)	0.27** (0.12)
Individual characteristics control	No	No	Yes	No	No	Yes
Constant	0.56***(0.03)	0.55***(0.03)	0.57***(0.08)	0.56***(0.03)	0.55***(0.03)	0.58***(0.08)
N	280	280	280	280	280	280

Note: \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and standard errors are reported in parentheses.

cooperation. Table 18 presents the contribution amounts and expected contribution amounts of participants with different religious identities when their counterparties in the game were from an ingroup, from an outgroup, or from an unknown religious group; the comparison test results are also included. The results indicate that Muslims contributed significantly less when their counterparties were from other religious groups than when their counterparties were also Muslims or when their counterparties' religious identity was unknown. Similarly, Muslims expected lower contributions when their counterparties were from other religious groups than when their counterparties were also Muslims or when their religious identities were unknown.

(2) Analysis of factors affecting the contribution amounts

We further performed regression analyses on the factors that affect the contribution amounts (Table 19). The results indicate that for the overall sample, no variables or interactions are significant. In the regression analyses of the Muslim subsample, the Outgroup variable is negative and significant, indicating that Muslims contributed significantly less when their counterparties were outgroup members than when the religious identities of their counterparties were unknown or when they were ingroup members (between-group effect:  $F = 4.85, p = 0.0317$ , partial  $\eta^2 = 0.857$ ). This finding is consistent with the nonparametric test results.

The impact of religiosity on the participants' level of cooperation was also tested. The regression results (Table 20) indicate that the Reli and Fund religiosity variables, as well as their interactions with the Ingroup and Outgroup variables, do not have a significant impact on the participants' level of cooperation. This finding indicates that the subjects' comprehensive religiosity and fundamentalist religiosity did not determine a specific religious group's contribution, which varied somewhat when facing counterparties from different religious groups.

**5. Conclusion**

Currently, China encourages freedom of religion and equality of all religions, featuring numerous believers belonging to the world's three largest religions – Buddhism, Christianity, and Islam. These three religions are not native to China; the times when they were introduced to

**Table 18**  
The difference test for contribution and expected contribution.

		Buddhists	Christians	Muslims	Non-believers
In-group	Contribution	15.00 (5.48)	13.55 (7.01)	15.20 (5.63)	14.40 (4.97)
	Expected contribution	14.45 (5.53)	12.65 (6.87)	14.10 (5.27)	13.30 (4.54)
Out-group	Contribution	16.20 (4.99)	16.37 (5.47)	11.90 (4.87)	14.37 (6.01)
	Expected contribution	14.67 (5.53)	15.07 (5.60)	9.93 (5.34)	13.73 (6.13)
Unknown identities	Contribution	17.10 (4.07)	15.60 (5.30)	16.80 (5.25)	15.30 (5.08)
	Expected contribution	15.50 (5.99)	15.20 (5.27)	17.00 (4.83)	14.30 (5.29)
In-group vs. Out-group	Contribution	$p = 0.7126$ $d = 0.2290$	$p = 0.2751$ $d = 0.4485$	$p = 0.0982^*$ $d = 0.6269$	$p = 0.9993$ $d = 0.0054$
	Expected contribution	$p = 0.9914$ $d = 0.0398$	$p = 0.3856$ $d = 0.3861$	$p = 0.0283^{**}$ $d = 0.6269$	$p = 0.9624$ $d = 0.0797$
In-group vs. Unknown	Contribution	$p = 0.1856$ $d = 0.4351$	$p = 0.3568$ $d = 0.3299$	$p = 0.8126$ $d = 0.2939$	$p = 0.7058$ $d = 0.1791$
	Expected contribution	$p = 0.5322$ $d = 0.1821$	$p = 0.2113$ $d = 0.4165$	$p = 0.1542$ $d = 0.5737$	$p = 0.5026$ $d = 0.2029$
Out-group vs. Unknown	Contribution	$p = 0.8526$ $d = 0.1977$	$p = 0.9125$ $d = 0.1430$	$p = 0.0595^*$ $d = 0.9677$	$p = 0.6543$ $d = 0.1671$
	Expected contribution	$p = 0.6786$ $d = 0.1440$	$p = 0.8893$ $d = 0.0239$	$p = 0.0085^{***}$ $d = 1.389$	$p = 0.9010$ $d = 0.0996$

Note: The values in the parentheses are the standard deviation. The  $p$  values were calculated by the Mann-Whitney test. The effect size (Cohen's  $d$  value) was also reported.

**Table 19**  
OLS regression results for factors affecting contribution.

	(1)	(2)	(3)	(4)	(5)
Outgroup	-1.04 (0.79)	-1.28 (0.83)	-0.90 (1.84)	0.77 (2.19)	-4.90** (1.90)
Ingroup	-1.21 (0.86)	-1.45 (0.90)	-2.10 (1.95)	-2.05 (2.32)	-1.60 (2.01)
Buddhist		1.56 (0.92)			
Christian		0.91 (0.92)			
Muslim		-0.57 (0.92)			
Constant	15.75***(0.61)	15.51***(0.67)	17.10***(1.59)	15.60***(1.90)	16.80***(1.64)
N	280	280	60	60	60

Note: \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and standard errors are reported in parentheses. The regression results for the allocation amounts by Buddhists, Christians, and Muslims respectively in the columns (3) – (5).

**Table 20**  
Impacts of religiosity on contribution.

	(6)	(7)	(8)	(9)	(10)	(11)
Outgroup	-1.01 (0.79)	-1.03 (0.79)	-1.12 (0.79)	-1.02 (0.79)	-1.03 (0.79)	-1.01 (0.79)
Ingroup	-1.24 (0.87)	-1.25 (0.87)	-1.22 (0.87)	-1.30 (0.86)	-1.30 (0.87)	-1.32 (0.87)
Reli	0.60 (0.65)	1.26 (1.31)	1.20 (1.17)			
Fund				1.41(1.00)	1.76 (2.28)	1.58 (2.15)
Reli × Outgroup		-1.18 (1.67)	-1.12 (1.65)			
Reli × Ingroup		-0.53 (1.70)	-0.38 (1.25)			
Fund × Outgroup					-0.46 (2.72)	-0.43 (2.56)
Fund × Ingroup					-0.43 (2.84)	-0.40 (2.69)
Individual characteristics control	No	No	Yes	No	No	Yes
Constant	15.7***(0.61)	15.7***(0.61)	15.7***(0.61)	15.8***(0.61)	15.8***(0.61)	15.8***(0.61)
N	280	280	280	280	280	280

Note: \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively, and standard errors are reported in parentheses.

China, and the methods by which they have been spread and the venues in which they are preached all vary among them. All three religions have been modified to adapt to China’s social environment. Therefore, the issues of which behavioral characteristics characterize the believers of the three religions in China and whether the followers of the three religions display strong ingroup favoritism have attracted people’s attention.

We conducted an online field experiment that employed a scale for measuring religiosity (comprehensive religiosity and fundamentalist religiosity) and recruited believers of the three major religions in China – Buddhism, Christianity, and Islamism – as subjects. In the experiment, using the dictator game, ultimatum game, trust game, and public goods game, we examined whether, when facing ingroup members and outgroup members, those belonging to different religious groups displayed different levels of social behaviors, e.g., altruism, fairness, trust, and cooperation, and we analyzed the factors that influence these religious groups’ social behaviors from the perspective of religiosity.

Based on the results, we found that Buddhist, Christian, and Muslim participants did not display exactly the same pattern of social behaviors when they faced counterparties from their own religious group as opposed to those from other religious groups. Buddhists and Christians proposed amounts in the ultimatum game for their ingroup counterparties that were significantly lower than what they proposed when their counterparties were from an outgroup, while Muslims had a lower requirement for fairness for ingroup members compared to the condition where religious identities were unknown. In contrast, the results of some previous studies, for example, [McLeish and Oxoby \(2011\)](#), found more rejections to ingroup proposals in the ultimatum game. In the trust game, Buddhists invested significantly lower amounts when facing ingroup members than facing those with unknown religious identities, while Muslims expected lower investments from outgroup members than from those with unknown religious identities. In the public goods game, Muslims contributed significantly lower and expect lower contributions when their counterparties were from the outgroup compared to when their counterparties were also Muslims. However, Buddhists and Christians did not show these behavioral patterns.

These results indicate that Christians and Buddhists did not exhibit ingroup favoritism in the games; they even displayed outgroup favoritism in the ultimatum game. This finding may be related to the Buddhist teachings encouraging that “all creatures are equal” and exhorting followers to “have empathy for all” or the Christian teaching to “love people.” Muslims, however, displayed ingroup favoritism or outgroup discrimination in almost all games, indicating that Islam has a more obvious attribute of group identification. In addition, compared to Christians and Buddhists, Muslims are a minority in China. Majority-minority status has an impact on behavioral games (e.g., [Gupta et al., 2018](#)) and the role of the majority-minority status of groups affects social behaviors, which might be crucial to intergroup encounters ([Espín et al., 2019](#)). Previous evidence indicates that members of majority status groups are concerned with not being perceived in a prejudiced way by the minority, whereas members of minority groups are more concerned with becoming the target of the majority’s prejudice ([Tropp & Pettigrew, 2005](#)); thus, as the minority, Muslims expected lower return and lower contributions from outgroup members than from ingroup members. As the majority, Buddhists and Christians provided monetary compensation to other groups. Buddhists and Christians exhibited outgroup favoritism: they proposed lower amounts for ingroup members than other group members in the ultimatum game, which can also be explained by the “fairness-seeking” motivation ([Luo et al., 2019](#)). However, all religious groups (Buddhists, Christians, and Muslims) had more forgiveness (lower MAOs) for “wrongs” (unfair proposals) committed by members of their own groups compared to other group members. In China, although a small proportion of the population believes in Buddhism, Christianity, Islam, and other globally mainstream religious beliefs, traditional Chinese Taoism and Confucianism have a strong influence on Chinese behavior. Compared with mainstream Western religions, traditional Chinese Confucianism and Taoism religions are more likely to teach people how to behave. There is no common religious worship among these religions, and the believers are unlikely to form a unified religious identity. Therefore, the pro-social behavior differences of Buddhists, Christians, and Muslim compared with nonreligious believers in this paper may also come from the

difference in organization and religious culture between mainstream religious believers worldwide and traditional folk religious believers in China.

In the experiment, we also identified the impact of religiosity on the participants' behaviors. The allocation amounts in the dictator game, the proposed amounts in the ultimatum game and contribution amounts in the public goods game were not affected by participants' comprehensive and fundamentalist religiosities, and the religiosities had no interaction effect with the religious groups on these three behaviors. In the trust game, higher degrees of religiosity led to lower investment when they faced ingroup members than when the religious identities of their counterparties were unknown. Additionally, higher degrees of comprehensive religiosity increased the rate of return when they faced ingroup members, while higher degrees of fundamentalist religiosity reduced the rate of return when participants faced outgroup counterparties. These results indicate that the participants' religiosities increased their ingroup favoritism in the return behavior to some extent. Previous studies have proposed that religiosity reinforces religious believers' ingroup favoritism or outgroup discrimination. For example, the experiment by Chuah, Hoffmann, Ramasamy and Tan (2014) indicated that fundamentalist religiosity augments between-group discrimination.

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### Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.socec.2021.101665.

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