

Exposure to supernatural agents and the role of social norms: Evidence from a lab-in-the-field experiment in Bangladesh

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Abstract: Traditional religious beliefs are widespread in rural areas of Bangladesh. Despite their importance, religious beliefs tend to be ignored when studying economic decision-making. We conducted a lab-in-the-field experiment (N=720) across 20 rural villages in Bangladesh to study how exposure to supernatural agents affects honest behavior. In our experiment, participants were randomly assigned to be exposed to either the PIR, an Islamic agent, or to the GUNIN, a traditional (witchcraft) agent. Compared to the control treatment, dishonesty is reduced by 6 percentage points when respondents are exposed to the Islamic agent while the traditional (witchcraft) agent does not affect honest behavior. By collecting a wide range of incentivized social norms measures, we find evidence suggesting that perceived norms are likely an important mechanism linking supernatural agents to honesty behavior. In a regression analysis, injunctive norms can explain about 40 percent of the treatment difference. The findings provide evidence of the importance of supernatural beliefs and related social norms, demonstrating that they can influence behavior and outcomes that are important for economic development.

Keywords: Supernatural belief; resource allocation; honesty; social norms; Bangladesh

JEL-Codes: C9, D63, D91, Z12

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1. Introduction

Supernatural beliefs are widespread across societies and play a significant role in shaping individual and social behavior. A large body of empirical studies find positive effects of monotheistic “Big God” religions - such as Christianity and Islam - on prosocial behavior (Henrich et al. 2010; Norenzayan 2013; Norenzayan et al. 2016; Shariff et al. 2016; Caicedo et al. 2023). Recently, economists have provided evidence on the importance of traditional supernatural beliefs, including belief in witchcraft, on economic decision-making (Gershman, 2016, 2022; Le Rossignol, Lowes, & Nunn, 2024; Butinda et al. 2024). Despite the prevalence and co-existence of “Big God” and traditional religions in daily life, we still have limited evidence of the causal effects of these supernatural beliefs on behavior and underlying social norms.

In this project, we conducted a lab-in-the-field experiment to study the causal effect of exposure to supernatural agents on honesty behavior and honesty norms involving 720 participants across 20 rural villages in Bangladesh. We measure honesty using the resource allocation game (RAG) developed by Hruschka et al. (2014). Using a fair dice roll, participants were asked to allocate money between themselves and an anonymous stranger from another village. In the experiment, there is a cost of following the rule and a benefit from cheating. Before the RAG was played, we informed participants about the option to donate an endowment to a local supernatural agent. Participants were randomly assigned to donate money either to the PIR, an Islamic agent, or to the GUNIN, a traditional (witchcraft) agent. Compared to the control treatment with no exposure, honesty significantly increases when respondents are exposed to the Islamic agent while the traditional (witchcraft) agent does not affect honest behavior.

Activating supernatural beliefs by reminding individuals about concepts such as karma and God has been shown to increase fairness and prosocial behavior among believers (White et al. 2019). Previous experimental research has shown that beliefs in moralistic, punitive, and knowing gods increase prosocial behavior toward distant co-religionists (Purzycki et al. 2016) and reduce cheating (Randolph-Seng & Nielsen, 2007; Shariff & Norenzayan, 2011). With respect to traditional belief systems, studies have documented cross-sectional relationships between the prevalence of witchcraft beliefs and trust (Gershman, 2016); disrupted social relations, lower happiness, more anxiety and pessimism, less innovation and entrepreneurship, and lower incomes (Gershman, 2022). Using a variety of lab-in-the-field experiments in the

Democratic Republic of Congo (DRC), Le Rossignol, Lowes, & Nunn (2024) find that individuals act less prosocially towards partners known to hold traditional religious beliefs. Butinda et al. (2023) demonstrate that traditional religious rituals affect business decisions and outcomes of small enterprises in the DRC. People believing in the effectiveness of traditional religious rituals purchase more inventory, experience fewer stock-outs, and have larger sales, revenues, and profits. We contribute to these studies by contrasting the impact of supernatural beliefs associated with either a moralizing “Big God” religion or traditional “witchcraft” religion on prosocial behavior.

To explain the underlying mechanism of behavior, we collected social norm measures related to honesty. Supernatural agents such as healers, witchcraft doctors, or any other religious leaders play a significant role in shaping social norms by promoting certain values and beliefs. Through engagement with such agents in the form of rituals, sermons, or donations, moral frameworks are established (Legare and Gelman 2008; Purzycki et al. 2012). For instance, monotheistic religions like Christianity and Islam emphasize the importance of love, justice, and compassion, which can influence societal norms toward cooperation and fairness (Norenzayan 2013; Shariff & Norenzayan, 2011). We measure social norms using the method developed by Krupka and Weber (2013) and elicit social acceptability of truth-telling and lying in the RAG. Our results show that the effects of exposure to the PIR (Islamic agent) are stronger for injunctive norms than for personal and normative beliefs. The impact of the traditional (witchcraft) agent on norms is less substantial. Our within-subject design allows us to run regression analysis with treatment variables and norm measures as explanatory variables and honest behavior as dependent variable. The regression analysis indicates that injunctive norms explain about 40 percent of the treatment effect. These findings are consistent with the view that beliefs in moralistic gods serve as mechanism for enforcing social norms prescribing cooperation, honesty, and generosity towards strangers (Purzycki et al. 2016; Shariff & Norenzayan 2011).

The next section provides a description of belief on religions in general, particularly belief on Islam and people's belief on supernatural agents in Bangladesh. Section 3 describes methods and experimental design. Section 4 presents the results and Section 5 concludes.

2. Background and Context of Bangladesh

The majority of the population in Bangladesh is Muslim (91 %), followed by Hindus (8 %) and other religions, including Buddhists and Christians (BBS 2022). Islam plays a fundamental role in society by shaping social behavior and beliefs of people (White 2012; Devine & White 2013). Besides Islam, traditional beliefs are also widespread in Bangladesh. Around 9 % believe in witchcraft, and 21% believe in evil eye (PEW 2012). In a small-scale study conducted in Bangladesh, approximately 50% of participants acknowledge the existence of black magic, while around 44% expressed a belief in the existence of the evil eye (Mullick et al. 2013). Research indicates that individuals often seek the assistance of witches to address the challenges they face in their daily lives, such as legal, family, financial, and health issues (Sultana & Ahmed 2019).

Donating money to supernatural agents, such as witches or spiritual healers, is a practice deeply rooted in the belief system of people in Bangladesh. People donate money to supernatural agents for various reasons such as seeking for spiritual guidance, protection and blessings, expressing gratitude and devotion, fulfilling religious obligations (e.g., alms to the poor), and enhancing social cohesion and identity. Important in the context of this study, donations activate religious beliefs that are deeply embedded in the human brain system. Next, we briefly describe two supernatural agents – (i) Pir or Islamic spiritual agent, and (ii) Gunin or traditional agent. The main difference between the two agents is their association with Islam. Pir is strongly related to Islam religion and has its origins in Sufism. In contrast, Gunin is based on more traditional and local beliefs.

Pir or Islamic agent

Pirs hold a significant position within Bangladeshi society, acquiring influence through the spiritual authority bestowed upon them (The Daily Star 2023). They are considered as holy individuals and are also seen as spiritual guides (Halim 2018). Pirs have a rich history in this region, introducing Bengal to Islamic thought and practice through their teachings and activities. Pirs also play a significant role in promoting religious harmony in various regions of the country (Al Masud, Abdullah, & Amin 2017). Pirs contribute to the resurgence of Islamic values (Huque & Akhter 1987) and maintain norms in this region (Halim 2018). Most people secure material benefit through the Pir's blessings, or they ask him to pray for the recovery from illness or other crises (Huque & Akhter 1987). Even after their death, the tombs of Pirs

become respected places, attracting numerous devout individuals and their followers (Ahamed 1983). A large number of people visit their shrines, seeking peace of mind and spiritual strength.

Gunin or Traditional agent

People having supernatural powers to address various problems and ailments are often called *Gunin* or *Kabiraj* in Bangladesh. They specialize in treating different illnesses and solving individual problems. They serve as intermediaries between the supernatural realm and the community (Karim 1988). They are believed to have magical power which can be invoked by chanting mantra (magical spells) (Chakrabarty 2021). *Gunin* are said to purposefully use their supernatural abilities not only for therapeutic purposes but also to inflict harm upon others, typically through secret arrangements (Haque et al. 2018). People in rural areas of Bangladesh have common perceptions that some illnesses and unlucky life circumstances are attributed to witchcraft and the evil eye, caused by envy. Therefore, people often seek the help of *Gunin* to overcome these challenges. People wear talismans or amulets provided by the *Gunin* or traditional agent to protect themselves from any harm or misfortune borne by jealousy or envy.

3. Data and Methods

3.1 Study area and Sampling

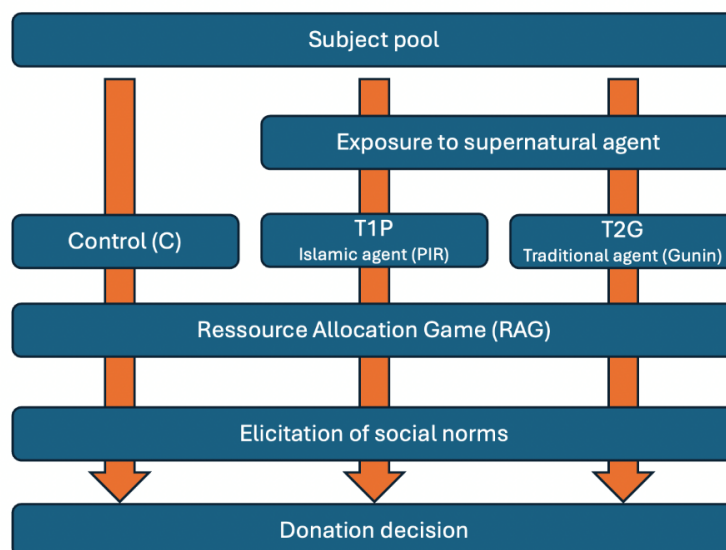
Our study was conducted in Khulna and Satkhira District, which are both part of the Khulna Division in southwestern Bangladesh. We cover three subdistricts (Upazila): Assasuni, Paikgachha, and Koyra from these two districts. These three subdistricts are organized into 28 local government unions called Union Parishad (UP). A UP includes about 15 to 20 villages. First, we randomly selected 10 out of 28 UPs. Subsequently, we randomly selected two villages per UPs for our study. In total, we randomly selected 20 villages across the two districts. The map in Figure A1 shows the study area and indicates the villages which are distributed across these three subdistricts. We applied systematic random sampling to select 36 individuals from each village. Four enumerators simultaneously started reaching households from four sides of the village (north, south, west, and east) and selected every third household. An adult household member above the age of 18 was asked to participate in the study. We reached for a balanced sample between sexes by selecting a female adult member in every second household. If a female (male) participant denied, enumerators went to the next nearest household and invited a female (male) person. As 90 % of the population in Bangladesh are Muslim and Pir and *Gunin*

are more common within Islam, we restricted our sample to Muslims (i.e., Hindus are not selected for the experiments).

3.2 Treatment Description

To study the exposure of supernatural agents on honesty, we implemented a lab-in-the-field experiment with two treatments and one control condition. The experimental design is summarized in Figure 1. Before the start of the experiment, all participants received an endowment of 50 Taka. In the two treatments, participants can voluntarily donate their endowment to local agents who are believed to have supernatural powers – the Pir, an Islamic agent, or the Gunin, a traditional witchcraft agent. Before we start with the explanations of the game in the individual sessions, we put the 50 Taka in an envelope labeled with the name of local supernatural agents, either Pir or Gunin. For the treatment T1P (Pir), the envelope is labeled with the name of the local Pir (who is well known in a village), and for the treatment T2G (Gunin), the envelope is labeled with the name of the local Gunin (who is well known in a village). People were told that this donation will be given to the local supernatural agent on their behalf at the end of the day. The envelope was visible in front of the participant during the whole session. When the participants made all their decisions regarding the resource allocation task and norms elicitation, they are asked to donate the endowment to the local supernatural agent or give it back to the experimenter (where the money comes from). To collect additional information about donation decision, participants in the control group (C) are also asked to donate 50 Taka to the local supernatural agent (either the Pir or Gunin envelope) or return it to the experimenter.

Figure 1: Experimental design



3.3 Experimental procedure

Procedures closely followed those set out by Henrich et al. (2006). In each village, 36 participants were selected via the household sampling procedure and asked to participate in the experimental task on the next day. Participants were invited to the local public place and summoned to a waiting area (Waiting Area 1). In this waiting area participants were allowed to talk with each other. However, the waiting area was patrolled by research assistants (RAs) to avoid contact with other villagers or participants who finished the game already. Next, we selected 12 participants (6 male and 6 female) from the pool in the waiting area and asked them to join the pre-experimental waiting room. In this waiting room, participants were not allowed to talk. They received the show-up fee, ID-card, a set of envelopes, and signed the consent sheet and registration log (see Appendix A for details). After the registration process, one of the researchers (Firoz Ahmed, who hails from the study area) explained the basic instructions of the experiment to the whole group. To facilitate comprehension, the game was illustrated using a playing board and chips. In addition, frequently asked questions were discussed to make sure everyone understood the instructions correctly. The researcher explained the matching procedure and told the participants that decisions are made in private.

After these initial instructions, participants were asked to go to a second waiting area (Waiting Area 2) from where they were allocated to private booths (small private area). We used four private booths, two for male and two for female participants. We assigned a male experimenter for the male booth and a female experimenter for the female booth. We prepared 36 protocols (3 x 12 protocols) and randomly distributed them among experimenters. In this way, participants were randomly allocated across conditions and less cognitive load was demanded by experimenters. In the private booths, the experimenter briefly explained the games and tested participants' comprehension by showing some examples. We recorded the number of mistakes in the comprehension questions (see below). After the games, participants conducted the post-experimental questionnaire including items on religious beliefs, religiosity, supernatural beliefs, trust, confidence, relatedness, envy, zero-sum thinking, trust, and socio-demographic characteristics.

3.4 Resource Allocation Game

We implemented the non-strategic Resource Allocation Game (RAG) to measure honest behavior (Hruschka et al. 2014; Lowes et al. 2017). For a single round of the game, the participant is given a six-sided die, with three black sides and three white sides. Further, they

received a stack of 10 plastic chips - each worth 20 Taka (200 Taka in total). This amount corresponds to approximately 1.70 Euros, which is nearly 1/2 of a daily wage in rural areas of Bangladesh. The participant is told that the stack of chips can be divided between herself or another party. The other party is a random citizen from another village in Khulna and Satkhira District.

The following procedure was implemented. First, the participant associates black with one of the two parties (e.g., herself or the other party) and white with the other party. Then she rolls the die and observes the color that is rolled. If it is white and she had mentally associated white with herself, then she puts one chip in an envelope marked for her (labeled as SELF). If she had mentally associated white with the other party, then she puts the one chip in the envelope for the other party (labeled as OTHER).¹ Participants repeat this procedure 10 times, each time making a new color association decision. After allocating all chips to the two small envelopes, they are asked to put them into a large envelope labelled with their ID-number and seal it. The enumerators collected all sealed large envelopes and brought them to the central office of the main researcher. Prior to the game being played, it was made clear to the participants that the envelopes would not be opened by the enumerator and would be brought back to a central office, where they would be opened by one person, who would never tell anyone the contents of the envelope.

The experimenters also tested the level of understanding by asking four test questions. If a participant answered all four questions correctly, she was invited to play the game in private. If the participant made at least one mistake, the experimenter returned to the example questions, re-asked all of the test questions again, and recorded the number of times the experimenters went through the test questions. Participants were only allowed to enter the game if all test questions were answered correctly (see experimental script in the Appendix). After testing comprehension, experimenters left the room and participants made their decisions in private.

3.5 Eliciting social norms

In this study, we rely on different types of social norms. First, we elicited descriptive norms, i.e., perceptions about others' honest behavior in the RAG. We informed people that we know

¹ For illiterate participants or those with visual impairment, we used symbols and two different colors (green for SELF, red for OTHER).

all decisions made by participants in the RAG at the end of the day. We then asked them to guess how much chips most people allocated to the other person. The question was incentivized, i.e., participants received 50 Taka for a correct guess.

Second, we measured acceptability of potential actions in the game. We presented participants the following scenario: “Assume that out of 10 times, 5 times the color that allocated money to you shows up.” Then we asked the following six questions: how socially acceptable is it to allocate money 5 (6, 7, 8, 9, and 10) times to yourself? This question measures participants’ own expectations about their behavior and is referred to personal normative beliefs. Social acceptability is measured on a 4-point scale ranging from very socially unacceptable, somewhat socially unacceptable, socially acceptable, and very socially acceptable. Next, we informed participants that we know the answers to this first question at the end of the day. Participants are asked to choose the most common response chosen by others for how acceptable an action in the five scenarios is. This question measures participants’ perception of what behavior is approved or disapproved by others and is referred to injunctive norms. Injunctive norms are incentivized. Participants are told that they receive 50 Taka according to only one correct guess, which will be determined by a lottery at the end. Therefore, any correct guess out of six guesses has a chance to be paid. This method is comparable to the elicitation approach of Krupka and Weber (2013).

3.6 Donation decision

Finally, the experimenter asked for an actual donation to the supernatural agent (Pir or Gunin) or to give the money back to the experimenter. In each private booth, we provided two boxes, one for the donation box and the other for the return box. They are asked to put the envelope labeled with the name of the local Pir or Gunin to either the donation box labeled as ‘Donation’ or the box to give it back labeled as ‘Return’ (from where the money comes). After explaining the instructions for donation decisions, experimenters left the room and participants made their decision in private.

4. Results

4.1 Sample characteristics and summary statistics

Table A1 in the Appendix presents sociodemographic characteristics of the respondents. The average age of participants is 37 years, with an average of 8 years of schooling. Approximately 63% have access to TV, and around 32% have access to the internet. There are no significant differences in age, years of schooling, access to TV, access to the internet, community leadership, number of earning members, household income (BDT), family type, or family size across the treatment arms.

Regarding religious characteristics, respondents frequently follow religious practices associated with Islam, with an average frequency of attending mosques or praying at home of 5 on a scale of 0 (never) to 6 (several times a day), and about 60% follow religious norms (see Table A2 in the Appendix). Belief in PIR is relatively higher to belief in GUNIN. Additionally, 41% have contacted PIR and 23% have contacted GUNIN before this study. No significant differences are found in any religious characteristics across the treatment arms (see Table A2 in the Appendix).

We also asked participants about perceived reasons why people should contact supernatural agents (see Figure A2 in the Appendix). We observe some similarities and differences between PIR and GUNIN. 74 % of participants stated people should contact the PIR or GUNIN to receive cure from an illness or disease. However, there are some major differences. People perceive that the PIR should be contacted more often than the GUNIN when it comes to financial issues such as being successful in business (41 % vs. 28 %, MW-test: $p < 0.001$) or getting rich quickly (17 % vs. 11 %, MW-test: $p < 0.001$). In contrast, the GUNIN is perceived to be contacted more often than the PIR when it comes to placing spells on others (2 % vs. 21 %, MW-test: $p < 0.001$), curing spells placed by witches (12 % vs. 34 %, MW-test: $p < 0.001$), or inflicting pain to someone (29 % vs. 1 %). In sum, PIR is associated with more positive outcomes such as healing or luck in financial issues, while the GUNIN is associated with more negative outcomes such as black magic or sorcery.

Regarding donations, 55% of participants donated at the end of the experiment (see Table A3 in the Appendix). As detailed in subsection 3.2, participants were asked to either donate or return the money to the experimenter after making all their decisions. To ensure comparability

across treatment arms and check the experiment's effect on donation decisions, we randomized the option to donate either to PIR or GUNIN in the control group. There is no significant difference in donations to Pir or Gunin in treatments compared to the control group. However, a significant difference is observed between donations to PIR and GUNIN (72 % vs. 40 %, MW-test: $p < 0.001$), likely reflecting the respondents' stronger attachment to PIR (Islamic agent) compared to GUNIN (traditional agent) in Bangladesh.

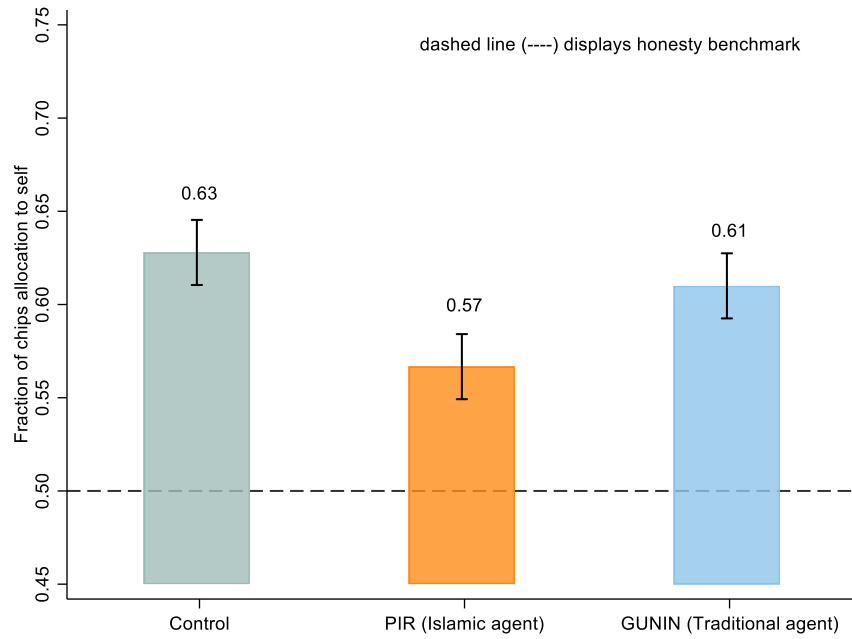
4.2 The impact of exposure to supernatural beliefs on honesty

Figure 2 (A) reports the average fraction of chips allocated to the other party. We normalized the outcome of the RAG on a scale ranging from 0 (no chips allocated to own envelope) to 1 (all chips allocated to own envelope) and consider 0.5 as the honesty benchmark. Participants allocated 63 % of chips to their own envelope in the control treatment. Dishonesty is reduced by 6 percentage points (pp) in the PIR treatment, in which participants allocated 57 % of chips to their own envelope. In the GUNIN treatment, participants allocated 61 % of chips to their own envelope. The difference between the PIR treatment and control group is statistically significant (Mann–Whitney [MW] test: $p < 0.001$). The difference between the PIR treatment and GUNIN treatment is also statistically significant (Mann–Whitney [MW] test: $p < 0.001$). Additionally, we observe a significant treatment effect on the percentage of people who follow the honesty benchmark, i.e., allocating 50 % of chips to their own envelopes (other's envelopes). In the PIR treatment, 35 % of the participants follow the honesty benchmark, while only 21 % (22 %) do so in the control group (GUNIN treatment) (see Figure A3 in the Appendix). The difference between the PIR treatment and control group (GUNIN treatment) is statistically significant (PIR vs. control, MW test: $p = 0.002$); PIR vs. GUNIN, MW test: $p = 0.002$. These findings suggest that the subjects in the PIR treatment (Islamic agent) exhibited significantly more honest behavior compared to the control group (without any condition), while the GUNIN treatment (Traditional agent) has no significant treatment effect.

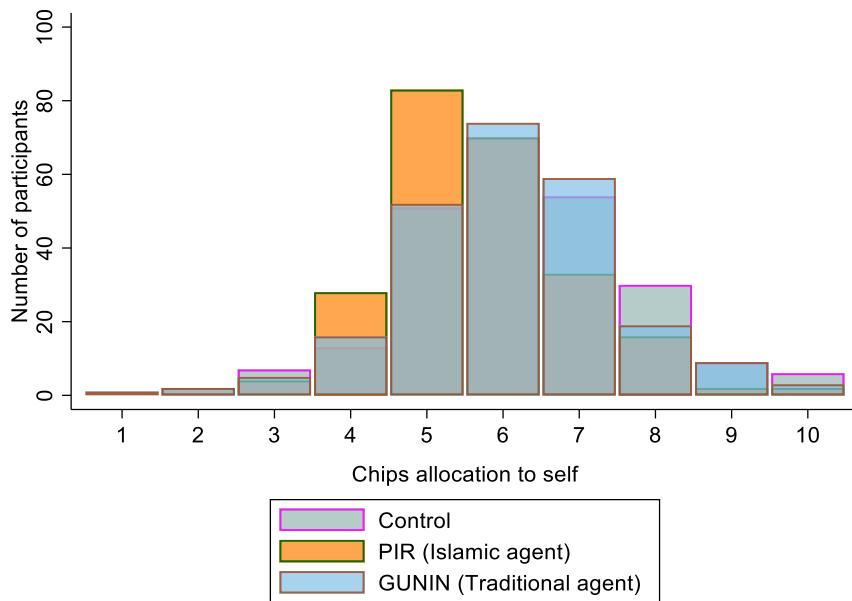
The distribution of chips across the treatment groups is presented in Figure 2 (B). The pattern reveals that the majority of participants in the PIR treatment allocate five and four chips to their self-envelope, as opposed to the control group. Conversely, a greater number of participants in the control and GUNIN treatment allocate more than five chips to their own envelope. This overlap in distribution clearly indicates that a higher proportion of participants adhere to the rules of the game in the PIR treatment compared to the control group.

Figure 2: The effect of exposure to supernatural beliefs on honesty

Panel A: Mean allocations across the treatments



Panel B: Distributions of allocation across the treatments



Note: Panel (A) shows the average fraction of chips allocation for control, PRI (Islamic agent) treatment and GUNIN (Traditional agent) treatment, respectively. The dashed line shows the benchmark for honesty (50% of chips allocation to own envelope). 95% confidence intervals are shown. Panel (B) shows the distribution of chips allocation across the treatment groups.

To rule out that potential confounders may drive our results, we run Ordinary Least Square (OLS) regressions. The results of this exercise are presented in Table 1. In column 1, we first show regression results from a bivariate regression (no control variables). Compared to the control treatment, dishonesty is reduced by 6.1 percentage points (pp) in the PIR (Islamic agent) treatment, while the effect of the GUNIN remains insignificant. In column 2, we control for potential influences of assistants by including experimenter fixed effects. The results are essentially the same. To control for unobserved heterogeneity across villages, we add village fixed effects in column 3. Results remain unchanged. In column 4, we add a set of sociodemographic controls, which includes the subject's age, education, access to TV, access to the internet, respondents' community leadership, family size, family type, family income, and number of earning members of the family. Adding these control variables has no effect on the size and stability of the PIR (Islamic agent) treatment. In column 5, we add a bunch of other control variables such as religious practices, religious beliefs, engagement with supernatural agents, risk preferences, altruism, zero-sum thinking, and envy (for details, see notes in Table 1). Once again, the results are robust and consistent. Overall, the coefficient for the PIR treatment varies from 6.0 pp to 6.2 pp across columns 1 to 5, which indicates a stable and significant effect of activating the concept of Islamic agent. However, we do not observe any significant effect of the GUNIN treatment.

Table 1 The effect of exposure to supernatural beliefs on honesty

	(1)	(2)	(3)	(4)	(5)
PIR (Islamic agent)	-0.061*** (0.013)	-0.062*** (0.013)	-0.062*** (0.012)	-0.061*** (0.012)	-0.060*** (0.012)
GUNIN (Traditional agent)	-0.018 (0.011)	-0.015 (0.011)	-0.015 (0.013)	-0.015 (0.013)	-0.015 (0.013)
R-squared	0.034	0.082	0.125	0.160	0.209
Observations	720	720	720	720	720
Experimenter fixed effect	-	✓	✓	✓	✓
Village Fixed effect	-	-	✓	✓	✓
Sociodemographic controls	-	-	-	✓	✓
Religious controls	-	-	-	-	✓
Risk and prosocial controls	-	-	-	-	✓
Other controls	-	-	-	-	✓

Note: The dependent variable is the allocation of chips to self-envelope (0-1). The sociodemographic controls are age, education, access to TV, access to the Internet, respondents' community leadership, family size, family type, household income, and number of earning members of the households. The religious controls are attending the mosque or praying; the meaning of religion is to follow religious norms, belief in PIR, belief in GUNIN, belief in witchcraft, contact with PIR, contact with GUNIN, attachment with PIR believer, and attachment with the GUNIN believer. Risk and prosocial controls are risk preference and donating to a good cause. The other controls are zero-sum, envy, ethical values, respect, and trust within the society. Here ***, **, * indicate statistical significance at the 0.1% ($p < 0.001$), 1% ($p < 0.01$), 5% ($p < 0.05$) levels, respectively. SEs (in parentheses) are clustered at the village level.

4.2 The impact of exposure to supernatural beliefs on norms of honesty

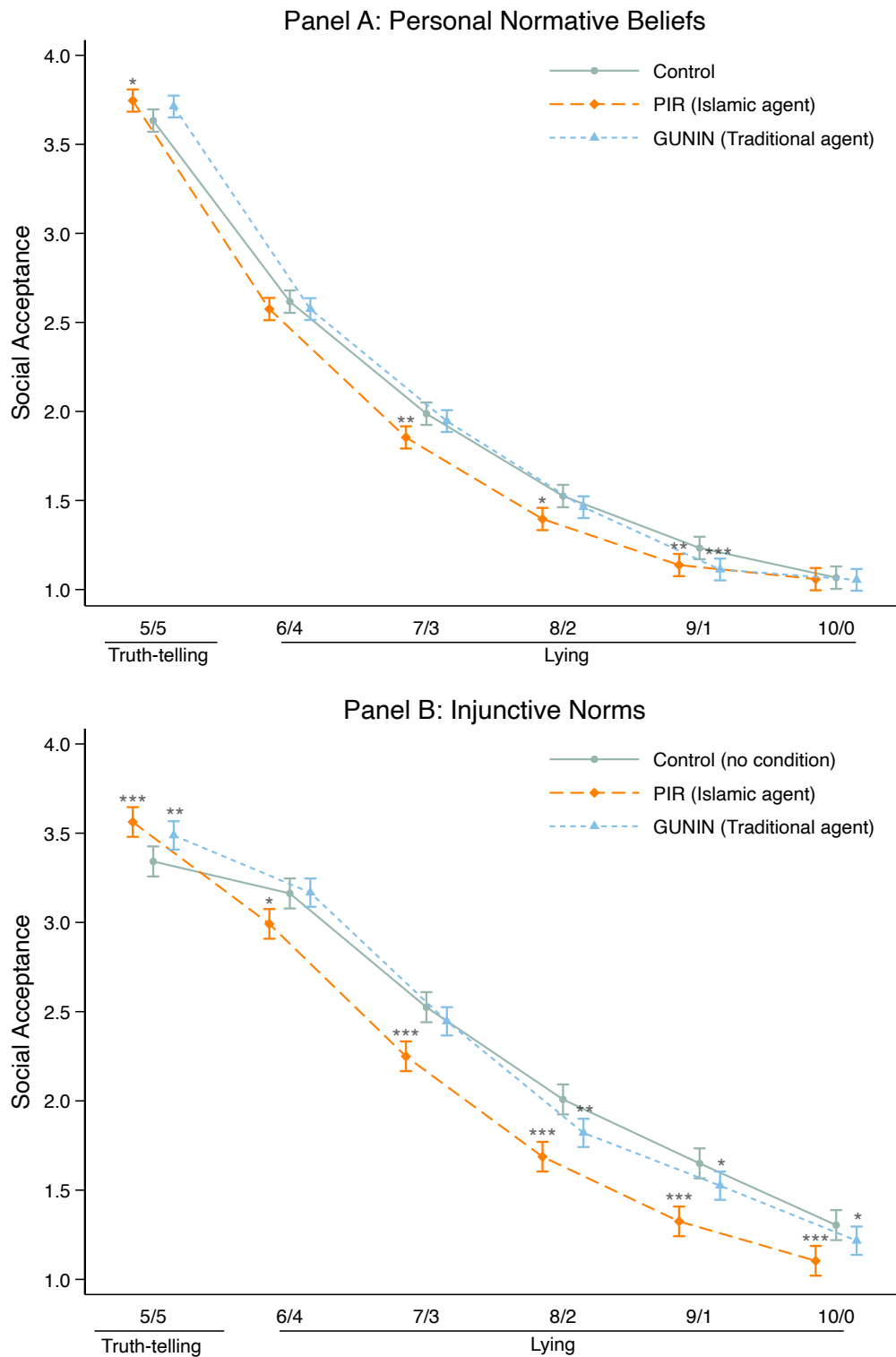
Next, we investigate how exposure to supernatural agents affects social acceptability of different actions in the RAG. We present results of personal normative beliefs (not incentivized) and injunctive norms (incentivized). The latter has the advantage that participants do not report their own beliefs but rather their expectations of what others will report about social acceptability of different actions. Participants were asked to evaluate six potential scenarios in the RAG. We consider scenario 5/5 (allocating 5 chips to the own (other) envelope) as social acceptability of truth-telling, while the other five scenarios (allocating chips to own/other envelope: 6/4, 7/3, 8/2, 9/1, 10/0) are defined as social acceptability of lying.

Figure 3 (A) and (B) present personal normative beliefs and injunctive norms, respectively. Social acceptability of truth-telling (scenario 5/5) tends to be higher in treatments with supernatural agents than in the control group (personal normative beliefs: PIR vs. control, Mann-Whitney (MW) test, $p=0.015$; injunctive norms: PIR vs. control, MW-test, $p<0.001$, GUNIN vs. control, MW-test $p=0.008$). Both panels indicate lower social acceptability of allocating more chips to the own envelope, i.e., decreasing social acceptability of lying. However, the effect is more pronounced for the PIR treatment (Islamic agent) in injunctive norms. The differences are significant at the 0.1 percent level (MW-test, $p<0.001$) except for scenario six (MW-test, $p<0.05$). These results provide evidence that exposure to the Islamic agent shifts injunctive norms.

To test the robustness of these findings, we report results from OLS regressions. Table 2 (A) and (B) display personal normative beliefs and injunctive norms, respectively. Columns 1 to 3 show the effect of treatments on acceptability of truth-telling, while columns 4 to 6 show the effect of treatment on acceptability of lying. The latter is an index computed as the sum of the five scenarios. In columns 1 and 4, we present specifications with village and experimenter fixed effects. In columns 2 and 5, we present results with the full set of individual and household level controls (see Table notes for details). In columns 3 and 6, we add the actual allocation in the RAG as a control variable along with the full set of controls. One main result stands out: the effect of the PIR treatment is significant and nearly twice as large for injunctive norms (Panel B) than personal normative beliefs (Panel A). This similar treatment effect holds for both the acceptability of truth-telling and the acceptability of lying. Even when we control for the actual allocation decision in the RAG, the effect of the PIR treatment remains significant at 0.1 percent level ($p<0.001$) for injunctive norms. These results suggest that exposure to the

Islamic agent is more effective in shaping injunctive norms compared to personal normative beliefs.

Figure 3: The impact of exposure to supernatural beliefs on norms of honesty



Note: Panel (A) and (B) show social acceptability of truth-telling and lying for actions in the RAG across treatments for personal normative beliefs (A) and injunctive norms (B), respectively. Social acceptability is measured on a scale from 1 (very socially unacceptable) to 4 (very socially acceptable). 95% confidence intervals are shown. ***, **, * indicate statistical significance at the 0.1% ($p < 0.001$), 1% ($p < 0.01$), 5% ($p < 0.05$) levels, respectively (Wilcoxon rank-sum (Mann–Whitney) test).

Table 2 The effect of exposure to supernatural beliefs on norms of honesty

	Five (acceptability of truth telling)			Six to Ten (acceptability of lying)		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Personal normative beliefs						
PIR (Islamic agent)	0.11** (0.04)	0.11** (0.04)	0.08 (0.04)	-0.08** (0.03)	-0.08** (0.03)	-0.01 (0.03)
GUNIN (Traditional agent)	0.08 (0.04)	0.07 (0.04)	0.07 (0.04)	-0.04 (0.03)	-0.05 (0.03)	-0.03 (0.03)
RAG (chips self-envelope)			-0.58*** (0.15)			1.07*** (0.08)
R-squared	0.10	0.14	0.16	0.11	0.14	0.30
Observations	720	720	720	720	720	720
Panel B: Injunctive norms						
PIR (Islamic agent)	0.22*** (0.05)	0.22*** (0.05)	0.17*** (0.05)	-0.18*** (0.04)	-0.18*** (0.04)	-0.13*** (0.03)
GUNIN (Traditional agent)	0.14** (0.05)	0.15** (0.05)	0.14** (0.05)	-0.05 (0.03)	-0.05 (0.03)	-0.04 (0.03)
RAG (chips self-envelope)			-0.73*** (0.16)			0.91*** (0.11)
R-squared	0.15	0.19	0.21	0.12	0.16	0.24
Observations	720	720	720	720	720	720
Experimenter fixed effect	✓	✓	✓	✓	✓	✓
Village Fixed effect	✓	✓	✓	✓	✓	✓
Sociodemographic controls	-	✓	✓	-	✓	✓
Religious controls	-	✓	✓	-	✓	✓
Risk and prosocial controls	-	✓	✓	-	✓	✓
Other controls	-	✓	✓	-	✓	✓

Notes: The dependent variables in panel A is personal normative beliefs and panel B is injunctive norms. The variable Five (acceptability of truth-telling) is the acceptability of scenario 5/5 and the variable Six to Ten (acceptability of lying) is an index computed as the sum over the five scenarios (6/4, 7/3, 8/2, 9/1, and 10/0). The sociodemographic controls are age, education, access to TV, access to the Internet, respondents' community leadership, family size, family type, household income, and number of earning members of the households. The religious controls are attending the mosque or praying; the meaning of religion is to follow religious norms, belief in PIR, belief in GUNIN, belief in witchcraft, contact with PIR, contact with GUNIN, attachment with PIR believer, and attachment with the GUNIN believer. Risk and prosocial controls are risk preference and donating to a good cause. The other controls are zero-sum, envy, ethical values, respect, and trust within the society. Here ***, **, * indicate statistical significance at the 0.1% ($p < 0.001$), 1% ($p < 0.01$), 5% ($p < 0.05$) levels, respectively. SEs (in parentheses) are clustered at the village level.

4.3 Social norms as underlying mechanism

In this section, we turn to our estimation to explain the treatment effect on honest behavior through social norms. We simply compare the role of social norms in estimating the effect size of PIR and GUNIN on honesty compared to control group. We consider social norms as potential mechanism explaining the effect of exposure to supernatural agents on honesty. To test the role of social norms, we add social norm measures as explanatory variable in an OLS regression in addition to treatment variables. Columns 1 and 2 of Table 3 include models without social norms to benchmark our results. Columns 3 to 6 include personal normative

beliefs and injunctive norms in sperate regressions. Regarding personal and normative beliefs, the treatment effect of PIR declines by about 1.7 percentage points. The decline is stronger for injunctive norms. Compared to column 2 (1), the treatment effect of PIR declines by about 2.5 percentage points. This corresponds to a decline in effect size by about 42 %. Further, in columns 4 and 6, the coefficient of acceptability of lying is larger than the coefficient of acceptability of truth-telling. This indicates that people's perceived norms of lying are more important than perceived norms of truth-telling. Overall, the results indicate a more pronounced effect of injunctive norms compared to personal normative beliefs. These results suggest that social norms serves as a mechanism that explains the effect of exposure to supernatural agents on honest behavior.

Table 3 Social Norms explaining honesty under the treatment conditions

	(1)	(2)	(3)	(4)	(5)	(6)
PIR (Islamic agent)	-0.061*** (0.013)	-0.060*** (0.012)	-0.043*** (0.011)	-0.043*** (0.011)	-0.032* (0.012)	-0.035** (0.011)
GUNIN (Traditional agent)	-0.018 (0.011)	-0.015 (0.013)	-0.005 (0.010)	-0.005 (0.011)	-0.006 (0.010)	-0.006 (0.012)
Personal normative beliefs (truth-telling)			-0.029* (0.011)	-0.028** (0.010)		
Personal normative beliefs (lying)			0.184*** (0.015)	0.167*** (0.015)		
Injunctive norms (truth-telling)					-0.035*** (0.007)	-0.030*** (0.009)
Injunctive norms (lying)					0.122*** (0.015)	0.102*** (0.014)
R-squared	0.034	0.209	0.249	0.363	0.190	0.301
Observations	720	720	720	720	720	720
Experimenter fixed effect	-	✓	-	✓	-	✓
Village Fixed effect	-	✓	-	✓	-	✓
Sociodemographic controls	-	✓	-	✓	-	✓
Religious controls	-	✓	-	✓	-	✓
Risk and prosocial controls	-	✓	-	✓	-	✓
Other controls	-	✓	-	✓	-	✓

Notes: The dependent variable is the fraction of chips allocation to own envelope (0-1). The variable personal normative beliefs (Five) is the acceptability of scenario 5/5 and the variable personal normative beliefs (6 – 10) is an index computed as the sum over the five scenarios (6/4, 7/3, 8/2, 9/1, and 10/0). The variable injunctive norms (Five) and injunctive norms (6 – 10) cover the injunctive norms following the same measures to personal normative beliefs. The sociodemographic controls are age, education, access to TV, access to the Internet, respondents' community leadership, family size, family type, household income, and number of earning members of the households. The religious controls are attending the mosque or praying; the meaning of religion is to follow religious norms, belief in PIR, belief in GUNIN, belief in witchcraft, contact with PIR, contact with GUNIN, attachment with PIR believer, and attachment with the GUNIN believer. Risk and prosocial controls are risk preference and donating to a good cause. The other controls are donation, zero-sum, envy, ethical values, respect, and trust within the society. Here *** **, * indicate statistical significance at the 0.1% (p<0.001), 1% (p<0.01), and 5% (p<0.05) levels, respectively. SEs (in parentheses) are clustered at the village level.

5. Conclusion

People in Bangladesh hold strong beliefs in supernatural forces including religious spiritual agent and traditional supernatural agent. Donation to both the religious agent and traditional agent is a common ritual and daily practiced in Bangladesh. In this setting, we measure people's honest behavior by using the donation to activate their belief on two supernatural agents – (i) PIR or Islamic agent and (ii) GUNIN or traditional agent. We measure honest behavior using the RAG in which participants allocated chips between themselves and an anonymous passive player (from adjacent village) based on a fair dice role. We also collected social norm measures including both their personal normative beliefs about injunctive norms.

This study reports three main results. Firstly, activating the belief in Islamic agents significantly increases honesty, while belief in traditional agents does not affect honest behavior. Donations activate supernatural beliefs: Individuals who hold a belief in Islamic spiritual agents, which are predominantly common in this region, exhibit greater honesty. Secondly, exposure to supernatural agents strongly influences their associated social norms in resource allocation. The influence of injunctive norms is more pronounced than that of personal normative beliefs. Finally, social norms mediate the effect of activating beliefs in supernatural agents on honesty. Overall, our findings have important implications for understanding the influence of supernatural agents and the role of social norms on honesty in countries where beliefs in centralized religions with monotheistic Gods and traditional religious beliefs are widespread. This is important given that about 48 % of the world's non-OECD population hold such beliefs.

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Appendix

Figure A1: Map of the study area

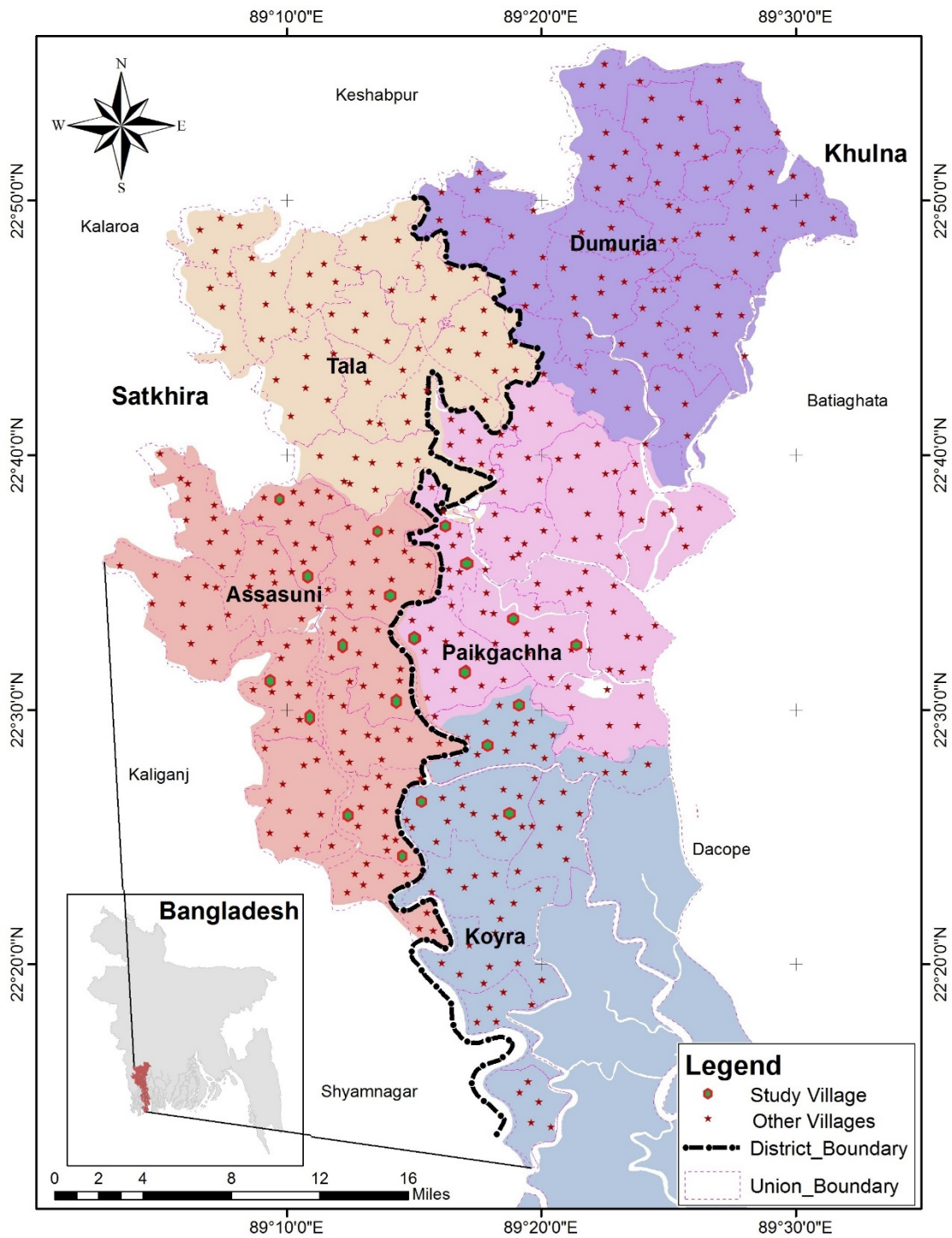
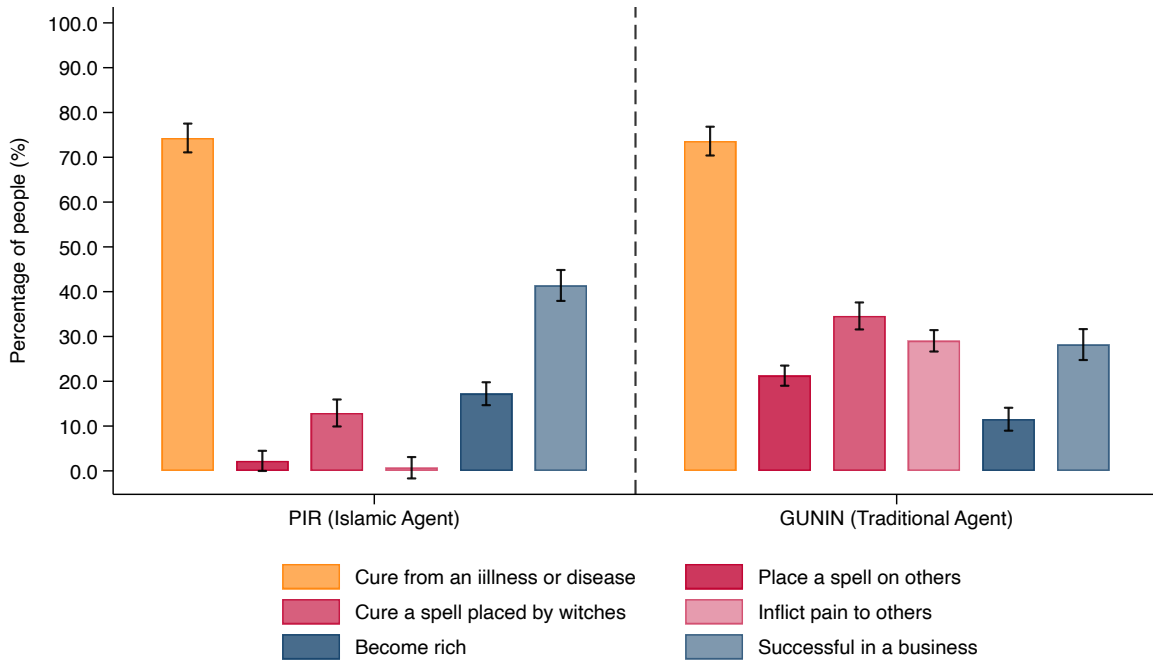
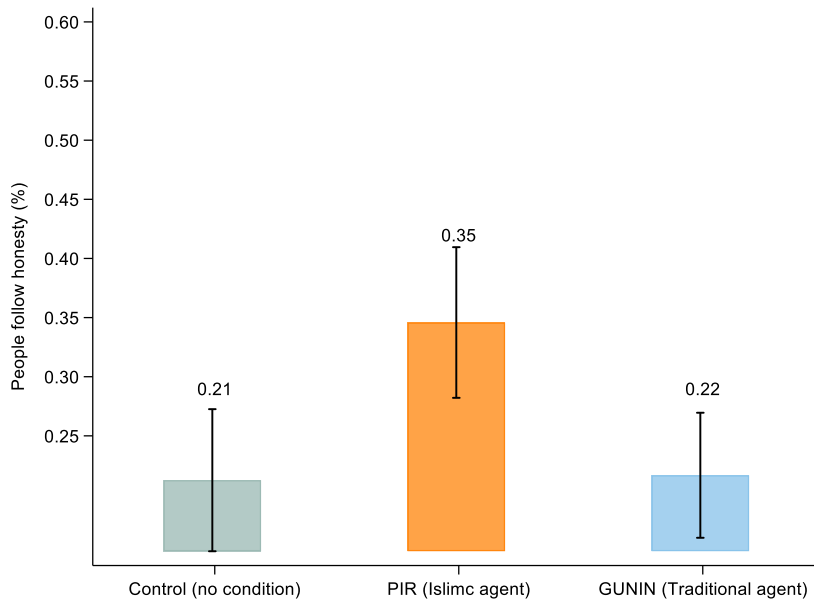


Figure A3: Reasons to contact PIR or GUNIN



Note: This figure shows the percentage of people stated the reasons to contact PIR or GUNIN. 95% confidence intervals are shown. N=720.

Figure A2: Percentage of participants follow honesty in chips allocation



Note: This figure shows the percentage of people who follow the honesty benchmark in chips allocation. 95% confidence intervals are shown.

Table A1: Sociodemographic characteristics

	Control (T0)	PIR (T1)	GUNIN (T2)	Overall	T1-T0	T2-T0	T2-T1
Age of the respondent (years)	37.66 (11.20)	36.59 (10.44)	37.00 (10.86)	37.08 (10.83)	-1.071 (0.838)	-0.663 (1.225)	-0.408 (1.327)
Schooling of the respondent (years)	8.20 (4.41)	8.18 (4.91)	7.80 (4.52)	8.06 (4.61)	-0.013 (0.496)	-0.400 (0.410)	0.387 (0.435)
Access to TV (=1 if yes)	0.65 (0.48)	0.62 (0.49)	0.62 (0.49)	0.63 (0.48)	-0.033 (0.039)	-0.029 (0.042)	-0.004 (0.051)
Access to Internet (=1 if yes)	0.32 (0.47)	0.33 (0.47)	0.30 (0.46)	0.32 (0.46)	0.017 (0.037)	-0.021 (0.032)	0.037 (0.043)
Community leader (=1 if yes)	0.28 (0.45)	0.30 (0.46)	0.26 (0.44)	0.28 (0.45)	0.017 (0.053)	-0.025 (0.037)	0.042 (0.051)
Earning member (number)	1.35 (0.57)	1.37 (0.59)	1.34 (0.56)	1.35 (0.57)	0.025 (0.047)	-0.008 (0.055)	0.033 (0.041)
Household income (BDT/month)	17015 (12488)	17188 (11233)	17279 (11387)	17161 (11700)	173 (1,276)	265 (1,390)	-92 (1,001)
Family type (=1 if single family)	0.83 (0.38)	0.82 (0.39)	0.83 (0.37)	0.83 (0.38)	-0.013 (0.030)	0.004 (0.037)	-0.017 (0.039)
Family size (number)	4.05 (1.26)	4.20 (1.47)	4.26 (1.32)	4.17 (1.35)	0.146 (0.106)	0.208 (0.110)	-0.063 (0.132)

Note: the first four columns report the mean of the corresponding variable with standard deviations in brackets. The last three columns report the difference across treatments. The treatment differences are derived from linear regression, with the variable of interest as the dependent variable and the treatment indicator as an independent variable, and standard errors clustered at the village level. *** p<0.001, ** p<0.01, * p<0.05

Table A2: Respondents religious characteristics

	Control (T0)	PIR (T1)	GUNIN (T2)	Overall	T1-T0	T2-T0	T2-T1
Attend the mosque or pray (likert scale 0 – 6)	5.99 (1.29)	5.02 (1.34)	4.98 (1.33)	5.00 (1.32)	0.033 (0.098)	-0.004 (0.134)	0.038 (0.084)
Meaning of religion is to follow religious norms (=1 if yes)	0.59 (0.49)	0.60 (0.49)	0.61 (0.49)	0.60 (0.49)	0.017 (0.051)	0.021 (0.051)	-0.004 (0.046)
Belief in witchcraft (mean score 1-5)	1.58 (0.70)	1.62 (0.71)	1.60 (0.70)	1.60 (0.71)	0.044 (0.076)	0.022 (0.069)	0.022 (0.076)
Belief in PIR (mean score 1-4)	1.87 (0.92)	1.97 (0.87)	1.89 (0.92)	1.91 (0.90)	0.094 (0.082)	0.021 (0.080)	0.073 (0.076)
Belief in GUNIN (mean score 1-4)	1.44 (0.66)	1.52 (0.67)	1.55 (0.71)	1.51 (0.68)	0.075 (0.074)	0.110 (0.057)	-0.035 (0.062)
Contacted with the PIR before (=1 if yes)	0.41 (0.49)	0.44 (0.50)	0.38 (0.49)	0.41 (0.49)	0.029 (0.046)	-0.033 (0.043)	0.062 (0.043)
Contacted with the GUNIN (=1 if yes)	0.22 (0.41)	0.24 (0.43)	0.23 (0.42)	0.23 (0.42)	0.021 (0.041)	0.013 (0.040)	0.008 (0.046)

Note: The first four columns report the mean of the corresponding variable with standard deviations in brackets. The last three columns report the difference across treatments. The treatment differences are derived from linear regression, with the variable of interest as the dependent variable and the treatment indicator as an independent variable, and standard errors clustered at the village level. *** p<0.001, ** p<0.01, * p<0.05

Table A3: Respondents actual donation decision

	Control (PIR) (T0)	Control (GUNIN) (T0)	PIR (T1)	GUNIN (T2)	Overall	T1-T0	T2-T0	T2-T1
Donation (=1 if donated)	0.74 (0.43)	0.32 (0.47)	0.72 (0.45)	0.40 (0.49)	0.55 (0.50)	-0.025 (0.038)	0.083 (0.040)	-0.317*** (0.717)

Note: The first two columns report the mean of the actual donation decision by respondents in the control group with standard deviations in brackets. Within the control group, 50 % are in PIR, and 50 % are in the GUNIN. The next two columns report respondents' actual donation decisions in the PIR and GUNIN treatments, respectively, with standard deviations in brackets. The last three columns report the difference across treatments. The treatment differences are derived from linear regression, with the variable of interest as the dependent variable and the treatment indicator as an independent variable, and standard errors clustered at the village level. *** p<0.001, ** p<0.01, * p<0.05.