

Supernatural norm enforcement:

Thinking about karma and God reduces selfishness among believers

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### Abstract

Four experiments (total  $N = 3591$ ) examined how thinking about Karma and God increases adherence to social norms that prescribe fairness in anonymous dictator games. We found that (1) thinking about Karma decreased selfishness among karmic believers across religious affiliations, including Hindus, Buddhists, Christians, and non-religious Americans; (2) thinking about God also decreased selfishness among believers in God (but not among non-believers), replicating previous findings; and (3) thinking about both karma and God shifted participants' initially selfish offers towards fairness (the normatively prosocial response), but had no effect on already fair offers. These supernatural framing effects were obtained and replicated in high-powered, pre-registered experiments and remained robust to several methodological checks, including hypothesis guessing, game familiarity, demographic variables, between- and within-subjects designs, and variation in data exclusion criteria. These results support the role of culturally-elaborated beliefs about supernatural justice as a motivator of believer's adherence to prosocial norms.

*Keywords:* Religion, Prosociality, Dictator Game, Karma

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All over the world, there is widespread belief that norm adherence is rewarded and punished by supernatural entities (Johnson, 2015; Norenzayan et al., 2016; Purzycki et al., 2012; Purzycki, 2016). Supernatural beliefs provide a culturally-supported mechanism that can encourage the adoption of particular norms (by framing certain actions as especially valued by supernatural agents) and inhibit norm violation (by positing supernatural punishment for counter-normative behavior). Subsequently, supernaturally-enforced prosocial norms can foster increased cooperation and support the long-term success of large groups of unrelated individuals (Norenzayan et al., 2016; Watts et al., 2015). In many world religions, supernatural norm enforcement takes the form of a moralizing God, and experimental reminders of this has been found to encourage prosociality among believers (Shariff, Willard, Andersen, & Norenzayan, 2016; Yilmaz & Bahçekapili, 2016). There is also growing cross-cultural evidence that commitment to such gods is associated with adherence to social norms prescribing cooperation, honesty, and generosity towards strangers (Purzycki et al., 2016; Shariff & Norenzayan, 2011).

Moralizing gods are central to many religions, but are only one instance of the world's religious diversity that could be relevant to norm adherence (Norenzayan, 2016). In major Asian religious traditions (e.g., Buddhism, Hinduism), and for many "spiritual but not religious" Westerners, people's actions are instead regulated by karma, a putatively non-theistic supernatural force that ensures norm followers experience good outcomes and norm violators experience misfortune, either within one's current lifetime or across lifetimes (Bhangaokar & Kapadia, 2009; Callan, Ellard, & Nicol, 2006; Converse, Risen, & Carter, 2012; Pew Research Center, 2015; White, Norenzayan, & Schaller, In press). Karma provides an important test case

for both the generalizability and the mechanisms underlying religiously-motivated norm adherence, yet psychological research on belief in karma remains scarce.

In four experiments, we address this gap by investigating how reminders of karma, like reminders of God, encourage prosocial norm adherence in anonymous dictator games, and we demonstrate several boundary conditions for this effect. Cultural evolutionary theories hypothesize that karma and God play similar roles in motivating prosocial behavior, which would then help explain how both karmic religions and theistic traditions have expanded and stabilized in increasingly large communities (Norenzayan et al., 2016; White, Sousa, & Prochownik, 2016). The conceptual similarities between karma and moralizing gods imply that both of these beliefs will encourage adherence to prosocial norms in economic games. We therefore hypothesized that individuals who believe that karma is real will behave less selfishly when they are reminded of karma.

Given that karma is believed to be a moralizing, supernatural force that intervenes in human affairs, it may seem obvious that thinking about karma can foster prosociality. However, karma also provides a supernatural explanation for why people deserve the blessings and misfortune that they receive. Therefore, it is conceivable that karma could be used to rationalize selfish behavior: Endowments in economic games could be viewed as deserved karmic rewards, thereby justifying selfishness. Karma may operate as a system-justifying belief (Cotterill, Sidanius, Bhardwaj, & Kumar, 2014), rather than a motivator of norm adherence. The present experiments allowed us to test this alternative hypothesis.

### **Theory-relevant moderators and individual differences**

Priming religious concepts has been found to increase prosociality in many experimental studies. In a series of meta-analyses, the religious priming effect was consistent with evidentiary

value in p-curves and robust to at least one technique that corrected for publication bias (Shariff et al., 2016). However, meta-analyses are no substitute for high-powered replications (Nelson, Simmons, & Simonsohn, 2018; van Elk et al., 2015) and there have been notable replication failures (e.g., Billingsley, Gomes, & McCullough, 2018; Gomes & McCullough, 2015), making the efficacy of religious priming an ongoing debate.

Several studies have also found that individual differences in belief in a punitive god predicts greater prosociality, while a benevolent god, if anything, encourages less prosocial behavior (DeBono, Shariff, Poole, & Muraven, 2017; Purzycki et al., 2016; Shariff & Norenzayan, 2011; Shariff & Rhemtulla, 2012; Watts et al., 2015). However, we expect individual differences to be only weakly predictive or unassociated with behavioral measures of prosociality when supernatural beliefs are not salient (Kelly, Kramer & Shariff, 2019). Prosocial behavior can be influenced by many considerations unrelated to supernatural belief, including the need to keep money to provide for oneself, the desire to help another person, and personal norms governing behavior towards strangers. Within a single population there is also likely to be variability in prosocial behavior but high cultural consensus about the traits of God and karma, limiting our ability to predict behavior from this restricted range (this limitation addressed by cross cultural studies; e.g., Lang et al., in press; Purzycki et al, 2016; Watts et al., 2015). We therefore expect that level of belief will be weakly or unassociated with generosity in general, but that situational reminders of karma and God will lead believers to be more prosocial.

### **The experimental paradigm**

In high-powered, pre-registered experiments, we investigated how explicitly thinking about karma or God affected giving in a multi-trial dictator game. Participants first played dictator games without any supernatural reminders, then were explicitly asked to think about

karma or God and play several more dictator games. We adapted and modified the experimental paradigm from Ginges, Sheikh, Atran, & Argo (2016), who asked participants to make moral decisions from their own perspective and from God's perspective, thus providing a within-subjects measure of how thinking about God affects moral judgments.

These reminders of karma and God provide an experimental manipulation that departs from traditional priming techniques in which the prime is subliminal, implicit, or presented as unrelated to the decision task. Instead, our procedure is more consistent with experimental paradigms that explicitly reframe the meaning of the decision task, to see how task behavior is shifted according to different norms in different contexts. For example, cooperation decreases when a Prisoner's Dilemma is labelled the "Wall Street Game" rather than the "Community Game" (Lieberman, Samuels, & Ross, 2004, see also Cronk, 2007; Pillutla & Chen, 1999). The supernatural framing procedure therefore cannot speak to debates about the evidentiary value of implicit religious priming effects (see Gomes & McCullough, 2015; Shariff et al., 2016; van Elk et al., 2015), but it does experimentally investigate how thinking about karma and God affects normative behavior. This paradigm also allowed us to test several theoretically-relevant moderators of the supernatural framing effect, something that has been difficult to do with previous paradigms.

### **Overview of hypotheses and experiments**

First, we hypothesized that baseline levels of generosity will moderate the effect of supernatural framing. If thoughts of karma and God discourage normatively-dubious behavior, then they should decrease selfishness (i.e., keeping all the money), but not affect individuals who are already behaving normatively (i.e., who divide the money in half), a previously-hypothesized but untested prediction (Norenzayan et al., 2016; Shariff & Norenzayan, 2015; Willard, Shariff,

& Norenzayan, 2016). In American (Klein & Epley, 2014) and cross-cultural samples (Klein, Grossmann, Uskul, Kraus, & Epley, 2015), fair behavior is judged more favorably than selfishness, but ultra-prosocial behavior is perceived no more favorably than fairness, and we hypothesize that God and karma are believed to have similarly-asymmetric social preferences.

Second, we hypothesized that supernatural framing would only increase prosociality among believers, while effects would be attenuated or absent for participants who explicitly reject the existence of God and karma. A recent meta-analysis found no reliable evidence that religious priming increased prosociality among non-believers (Shariff et al., 2016). If religious priming affected behavior by simply priming prosocial norms, then religious priming should not depend on belief, because both believers and non-believers hold similar concepts about the association between prosociality and God, karma, and religion (Gervais, 2013; White & Norenzayan, 2019). However, if concern about supernatural judgment is a key component, then supernatural reminders should only affect participants who actually believe that God or karma is real and relevant to their lives. In addition, we explored whether supernatural framing effects were stronger when generosity was more central to karma/God's moral concerns, and when karma/God was viewed as more punitive.

Finally, we investigated the generalizability of supernatural framing effects among participants with diverse religious backgrounds, including Hindus (who believe in both karma and God as distinct supernatural forces, Fuller, 2004), Buddhists (who prototypically believe in karma but not God), and nonreligious Westerners (who may or may not believe in God, and may believe in karma despite not learning this belief from their religious communities or family members). This diverse sampling addressed religious identity signaling as an alternative explanation for our results. According to this perspective, thinking about karma or God might

remind participants about their religious identity, and prompt believers to signal their religious identities by acting prosocially. If this were the case, then karma and God should affect behavior most strongly for participants who associate karma/God with their religious affiliation. In contrast, if it is the supernatural beliefs themselves and not religious identities that motivate prosociality, then reminders of karma would be expected to affect the behavior of both believers associated with karma-centered religions (e.g., Hindus) and karma believers unaffiliated with these religious traditions (e.g., Christian and non-religious Americans).

Experiment 1 provided an initial test of whether thinking about karma and God both decrease selfishness among Americans who expressed belief in karma and God. Experiment 2 extended these effects to a different population of believers with different cultural histories of belief in karma and God: Hindus, Buddhists, and Christians. Experiment 3 compared believers and nonbelievers. In all three experiments we investigated whether the hypothesized effect is moderated by the generosity of baseline offers and participants' views of supernatural benevolence and punitiveness. In Experiment 4, we replicated these effects in a between-subjects design. We report how we determined sample sizes, disclose all data exclusions, manipulations, and measures (in the article and in the accompanying Supplemental Materials), and make all data publicly available.<sup>1</sup>

## EXPERIMENT 1

Experiment 1 investigated whether individuals who believe in karma give away more money when thinking about karma in a repeated dictator game (DG) paradigm. Additionally, we investigated whether individuals who believe in God give away more money when thinking about God. We also included a control (or neutral) condition, to assess whether participants'

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<sup>1</sup> All data relevant to these analyses is available at [https://osf.io/32x5t/?view\\_only=4456a8f9069f4629bea58eac62174dc9](https://osf.io/32x5t/?view_only=4456a8f9069f4629bea58eac62174dc9).



behavior changed over the course of repeated dictator games without supernatural framing. Finally, we investigated whether individual differences in belief predicted baseline giving or moderated the effect of supernatural framing.

### Methods

Before conducting this study, all methods, hypotheses, and analysis plans were pre-registered on the Open Science Framework (OSF), and can be accessed at

[https://osf.io/trnx7/?view\\_only=001b24b1b7964f1b80b28c1d66f29dfd](https://osf.io/trnx7/?view_only=001b24b1b7964f1b80b28c1d66f29dfd).

### Participants

We recruited American participants who expressed belief in God or karma from Amazon's Mechanical Turk (MTurk), in December 2016, in return for a small monetary payment (recruitment materials did not mention God, karma, or religion). Before any data analyses, we conducted a power analysis based on the estimated effect of religious priming on prosociality among believers, corrected for publication bias ( $d = .28$ ), according to a recent meta-analysis (Shariff et al., 2016; Willard et al., 2016). This indicated that a minimum sample size of 136 was required to detect a within-subjects effect with  $>.90$  power. We recruited a sample of 250 participants per condition to account for the possibility of lower-than-expected effect sizes. A sensitivity power analysis indicated that this sample size has 80% power to detect an effect size as small as  $d = 0.18$  in a two-tailed paired-samples t-test or to detect small correlations ( $r = 0.18$ ) between variables of interest.

Given that previous studies have not found reliable religious priming effects among non-believers (Shariff et al., 2016), for this study we only recruited participants who expressed explicit belief in God or karma. As specified in the preregistration, we excluded from participating any individuals who said that they did not believe in God and/or karma (i.e., scored

at or below scale midpoint) in a prescreening survey ( $n = 507$ ) or who reported non-belief at a later point in the survey ( $n = 55$ ). As preregistered, we also excluded individuals who failed an attention check question ( $n = 4$ ) and those who were directed to the full-length survey, but failed to complete it, thus providing insufficient data to test for hypothesized moderators: 27 did not complete the DG questions, and 177 answered the DG questions but did not complete the entire survey (rate of attrition did not significantly differ across conditions,  $N_{God} = 54$ ,  $N_{Karma} = 53$ ,  $N_{Neutral} = 70$ ,  $\chi^2(2) = 3.09$ ,  $p = .21$ ). Primary findings remain unchanged when these excluded participants were included in the total sample (see Supplemental Material). See Table 1 for demographic details of the final sample of participants ( $N = 754$ , after exclusions).

Participants were randomly assigned to three conditions: Karma, God, and Neutral. As mentioned, however, we were not interested in the effect of priming on non-believers for this study. As a result, the Karma condition excluded Karma non-believers, the God condition excluded God non-believers, and the neutral condition excluded those who did not believe in either entity. This assignment resulted in demographic differences across conditions, with the Karma framing condition ( $n = 250$ ) including more non-religious (Agnostic, Atheist, and unaffiliated) and fewer Christian participants, and more Karma believers and less God believers, than participants in the God framing condition ( $n = 254$ ; consistent with previously-documented demographic correlates of Karma belief in North America, White et al., In press). Participants in the Neutral condition ( $n = 250$ ) fell in between these two extremes. Note that these demographic differences cannot explain the within-subjects supernatural framing effect, because each participant served as his or her own control.

*Table 1. Demographic characteristics of participants in each experiment, after exclusions*

	Experiment 1			Experiment 2			Experiment 3		Experiment 4	
N	754			607			986		1244	
Source	MTurk			Qualtrics Panels			MTurk		Qualtrics Panels	
Gender	67% female			62% female			42% female		61% female	
Age <i>M (SD)</i>	37.47 (12.47)			47.24 (14.72)			35.42 (11.66)		45.79	
Ethnicity										
Caucasian	79%			42%			73%		80%	
Asian	5%			49%			12%		6%	
Other	16%			9%			15%		14%	
Framing Condition	God (Believers)	Karma (Believers)	Neutral	God (Christians)	Karma (Hindus)	Karma (Buddhists)	God	Karma	Karma	Neutral
Religion										
Christian	81%	58%	70%	100%	--	--	49%	46%	66%	64%
Non-religious	12%	30%	24%	--	--	--	42%	43%	24%	25%
Hindu	0%	1%	1%	--	100%	--	1%	1%	1%	1%
Buddhist	2%	4%	1%	--	--	100%	2%	1%	1%	1%
Other	5%	7%	4%	--	--	--	6%	9%	8%	9%
Belief in God <i>M (SD)</i>	8.34 (0.97)	6.56 (2.72)	7.22 (2.38)	8.00 (1.93)	7.58 (2.04)	5.36 (2.54)	5.54 (3.30)	5.56 (3.17)	6.84 (2.26)	6.62 (2.41)
Belief in Karma <i>M (SD)</i>	4.60 (1.61)	5.78 (1.19)	4.90 (1.62)	4.54 (1.41)	6.47 (1.43)	6.27 (1.34)	4.10 (1.79)	4.17 (1.74)	4.80 (1.58)	4.70 (1.62)
Social exposure to belief <i>M (SD)</i>	5.28 (1.17)	3.81 (1.26)	--	5.37 (1.15)	4.91 (1.16)	4.15 (1.35)	--	--	3.30 (1.50)	2.77 (1.50)

## Materials and Procedure

**Prescreening Survey.** After providing informed consent, participants completed a brief demographic questionnaire that included questions about age, gender, ethnicity, religious affiliation, political orientation, and nationality. Embedded in this were questions that assessed whether participants believe in the existence of karma (“Karma is a force that influences the events that happen in my life”) and believe in the existence of God (“I believe that god exists”) on a 9-point Likert scale (1 = *strongly disagree*, 5 = *neither agree nor disagree*, 9 = *strongly agree*).

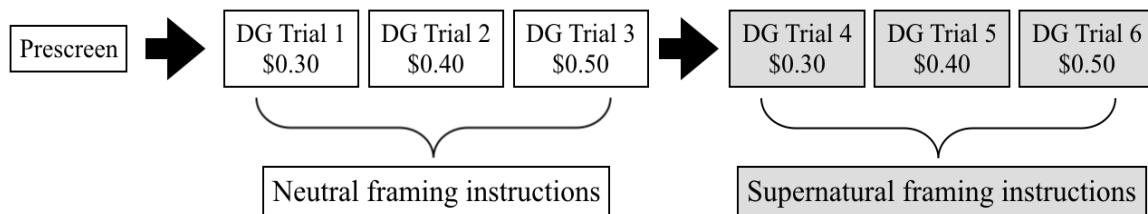
**Supernatural Framing and Repeated Dictator Game.** All participants who completed the prescreening survey received a small base payment, and participants directed to the full-length survey were also given the opportunity to receive a bonus payment determined by their dictator game responses. The dictator game is a common measure of prosociality that is also a valid predictor of cooperation in other real life situations (Benz & Meier, 2008; Franzen & Pointner, 2013; Peysakhovich, Nowak, & Rand, 2014, although see also Galizzi & Navarro-Martinez, 2018), and is widely used to study religious priming effects (e.g., Ahmed, 2009; Shariff & Norenzayan, 2007; Tan, 2006; Xygalatas, 2013).

Participants divided money between themselves and another anonymous participant in a 6-trial repeated dictator game task, depicted in Figure 1. For three trials (pre-framing), participants were instructed, without any mention of God or karma, to “indicate the amount of money that you want to take and keep for yourself, and the remainder will be given to another participant.” The identity of the recipient (e.g., Participant A, Participant B, and Participant C) and the amount of money (\$0.30, \$0.40, or \$0.50) varied across each trial, and presentation order was randomized. Although the amount of money was modest, it allowed participants to possibly

double their earnings. Participants were told that “After you complete this study, ONE of these decisions will be randomly selected, and you will be paid the amount of money that you chose to keep in that decision,” to make each individual decision meaningful and to deter any multi-trial response strategy (this payment for a subset of responses has been found to produce similar results as paying for every response, Charness, Gneezy, & Halladay, 2016).

Participants next completed three more DG trials (post-framing), in which participants in the God framing and Karma framing conditions were instructed to “make your decisions based on what your belief in God [your belief in the law of karma] would lead you to do.” Participants in the Neutral framing condition received the same non-supernatural instructions as before. We again varied the amount of money and recipient identity, and participants were reminded that they would only be paid for one decision. The money was real and was actually allocated according to participants’ decisions. We converted participants’ responses into scores indicating the proportion of money given away in each trial. In mixed-effects models, we predicted the proportion of money given away in each of the six trials. To summarize the results, we also created composite scores for the mean proportion of money given away in the first three trials (pre-framing giving,  $\alpha = .94$ ) and in the final three trials (post-framing giving,  $\alpha = .95$ ).

*Figure 1. Repeated dictator game procedure.*



After completing the six DG trials, participants described the strategy used to make their DG decisions (“What were you thinking about, when you decided how much money to keep for

yourself? What approach did you use to make that decision?”), reported whether they had “previously participated in other studies like this one, that involved exchanging money with strangers or other anonymous participants in the study,” and reported their perception of the purpose and hypotheses of this experiment (“What do you think was the purpose of this study? What results do you think we expected to find?”). Analyses accounting for these questions do not meaningfully change our pattern of experimental effects (see Supplemental Material).

***Religious Beliefs and Demographics.*** Participants next reported various aspects of their supernatural belief and religious commitment. Participants reported their view of God/karma as benevolent (“Loving,” “Forgiving,” and “Compassionate,”  $\alpha = .92$ ) and punitive (“Punishing,” “Vengeful,” “Fearsome,”  $\alpha = .81$ ). Belief in karma was assessed a second time through a previously-validated measure of karmic belief (White et al., In press), that assesses participants’ agreement that people’s actions have morally-congruent consequences, both within one life and across lives (e.g., “When people are met with misfortune, they have brought it upon themselves by behavior in a past life,”  $\alpha = .91$ ). Embedded in this karma questionnaire was one attention check question (“Please select ‘Disagree’ as your answer to this question”) that was used to exclude inattentive participants from this experiment.

Participants also completed several open-ended questions about God and karma (depending on their assignment to God or Karma framing conditions). Of relevance, participants were asked to list five actions “that would lead to good consequences because of god [karma],” and five actions that would lead to bad consequences, thus providing a spontaneously-generated list of actions that elicit supernatural rewards and punishments. These free list responses were coded according to a scheme developed by the first author and applied by a second independent research assistant (both while blind to experimental condition and the remainder of the data).

This coding grouped responses into categories of semantically-similar words, and below we focus on whether participants listed items from a broadly-defined generosity category (including giving, generosity, charity, or helpfulness) as something with supernatural rewards, or items from a broadly-defined greed category (including selfishness, greed, or unhelpfulness) as something with supernatural punishments. Responses were coded as 1 if mentioned and 0 if never mentioned in the free list. Raters agreed on the classification of responses into these categories in 93% of the cases, and discrepancies were resolved through discussion.<sup>2</sup> This open-ended data was collected to answer exploratory questions somewhat separate from the experimental supernatural framing effect, therefore these variables were not collected consistently across all datasets and analyses concerning these variables should be considered exploratory.

Finally, participants also described several elements of their religious background, including nine items,<sup>3</sup> adapted from Lanman and Buhrmester (2016), that assessed the extent to which participants had learned about karma/God from other people, including from religious sources (e.g., “I heard about God [karma] while attending religious services or meetings”), from friends and family members (e.g., “When I was a child, my family taught me to believe in God [karma]”) and from observing the actions of other people (e.g., “I saw people make personal sacrifices, because of God [karma]”). The mean of these items provided a composite score of participants’ social exposure to credible displays of belief (Karma  $\alpha = .79$ , God  $\alpha = .85$ ).

## **Results and Discussion**

### **Confirmatory Analyses: Supernatural Framing Manipulation**

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<sup>2</sup> Analyses that use other methods of quantifying the free list responses are available in the supplemental material. Other exploratory variables not discussed here are described in the pre-registration documents.

<sup>3</sup> Due to a technical error in the programming of this survey, participants in the Karma condition only completed 7 of these items.

In the Neutral condition, participants did not significantly change their pattern of giving between the first three trials and the final three trials of the dictator game, Cohen's  $d = -0.05$ , 95% CI  $[-0.23, 0.12]$ ,  $t(249) = 0.86$ ,  $p = 0.39$  (see Figure 2), nor did giving change according to the trial number,  $F(1, 249) = 0.53$ ,  $p = .47$ , or as a function of the money available in a given trial,  $F(1, 249) = .75$ ,  $p = .39$ . This uniformity indicates that this repeated DG paradigm is an appropriate method to study the within-subjects effect of supernatural framing, without any general order effects across trials.

We used mixed-effects models<sup>4</sup> to assess whether thinking about God and karma increased giving compared to participants' baseline levels of generosity. As pre-registered, this analysis focused on participants in the God and Karma conditions only (pre-frame giving did not differ from giving in the neutral condition). We predicted DG giving across all six trials from the presence of supernatural frame (0 = pre-framing, 1 = post-framing), the type of frame (0 = God, 1 = Karma), the interaction between frame presence and type of frame. We also included random intercepts and random effects of framing, nested within participant, to account for the nesting of trials within participants and variability in how supernatural framing affected participants based on their initial generosity. The estimates produced by this model indicate the change in the proportion of money given away due to each of the predictors (i.e., unstandardized effect sizes). We also report standardized effect sizes (Cohen's  $d$ ) and t-tests of the focal comparisons throughout the results, to allow easy comparison with previous studies.

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<sup>4</sup> We had initially intended, and pre-registered, the use of ANOVAs to investigate the framing effect across condition, but in all experiments, we instead used mixed-effects models (using the *lme4* and *lmerTest* packages in R). Mixed-effects models provide a more powerful analysis strategy that is equivalent to ANOVAs in assessing the influence of experimental conditions, but also allowed us to control for individual differences as possible moderators or alternative explanation for our effects. ANOVAs lead to an identical pattern of results, and are described in the Supplemental Material. We also report Cohen's  $d$  for to summarize simple effects (calculated using the *effsize* package in R).



As can be seen in Figures 2 and 3, results supported the primary hypothesis: Participants were more generous when thinking about karma,  $b = 0.11$ , 95% CI [0.085, 0.136],  $d = 0.56$  [0.38, 0.74],  $t(249) = 8.86$ ,  $p < .001$ , or God,  $b = 0.087$  [0.062, 0.112],  $d = 0.42$  [0.24, 0.59],  $t(253) = 6.63$ ,  $p < .001$ , than they were before thinking about these concepts. Giving was not significantly different in the God and Karma conditions,  $b = -0.008$  [-0.049, 0.031],  $p = .67$ , nor was there any interaction between condition and framing,  $b = 0.023$  [-0.014, 0.057],  $p = .21$ . The pattern of giving can also be seen in the distribution of giving (Figure 3), where fewer participants keep the money after supernatural framing.

Additional between-subjects analyses that compared post-frame giving across conditions further demonstrated that participants thinking about God gave away significantly more money than participants who received neutrally-framed instructions,  $d = 0.37$ , 95% CI [.19, .54],  $t(483.53) = 4.13$ ,  $p < .001$ , and Karma framing resulted in greater giving than did neutral framing,  $d = 0.47$  [.29, .65],  $t(497.04) = 5.23$ ,  $p < .001$ , while God and Karma framing did not lead to significantly different levels of giving,  $d = -0.06$  [-.12, .23],  $t(490.53) = 0.63$ ,  $p = .53$ . We also investigated several alternative models (presented in the Supplemental Materials), and the supernatural framing effect remained the strongest predictor of giving when controlling for the amount of money distributed in each trial (pre- vs. post-frame effect:  $b = 0.081$ ,  $p < .001$ ), or controlling for participants' perceptions about the purpose of the experiment (including hypothesis-guessing) and their familiarity with DG tasks (frame effect:  $b = 0.056$ ,  $p = .008$ ). None of these factors were significant moderators. The pattern of results also remained unchanged if we included all participants who provided DG responses (including those excluded based on preregistered criteria), indicating that the results were robust to data exclusion criteria.

Figure 2. Mean proportion of money given away in Experiment 1, before and after supernatural framing. Error bars indicate 95% confidence intervals around the mean.

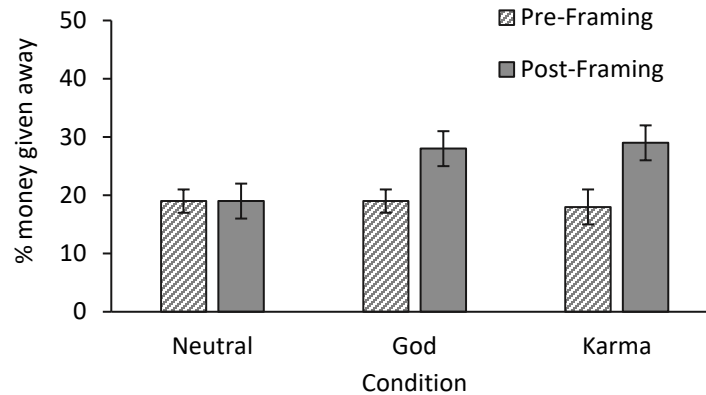
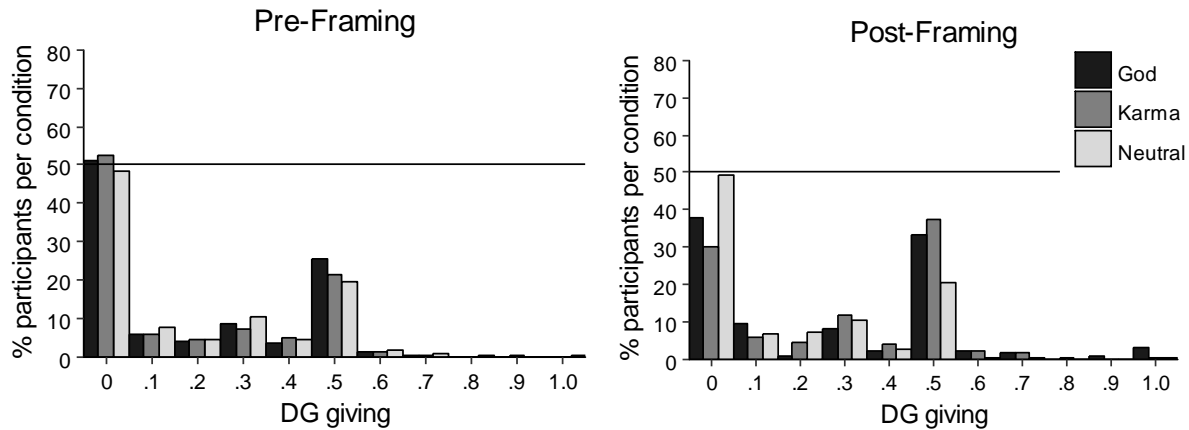


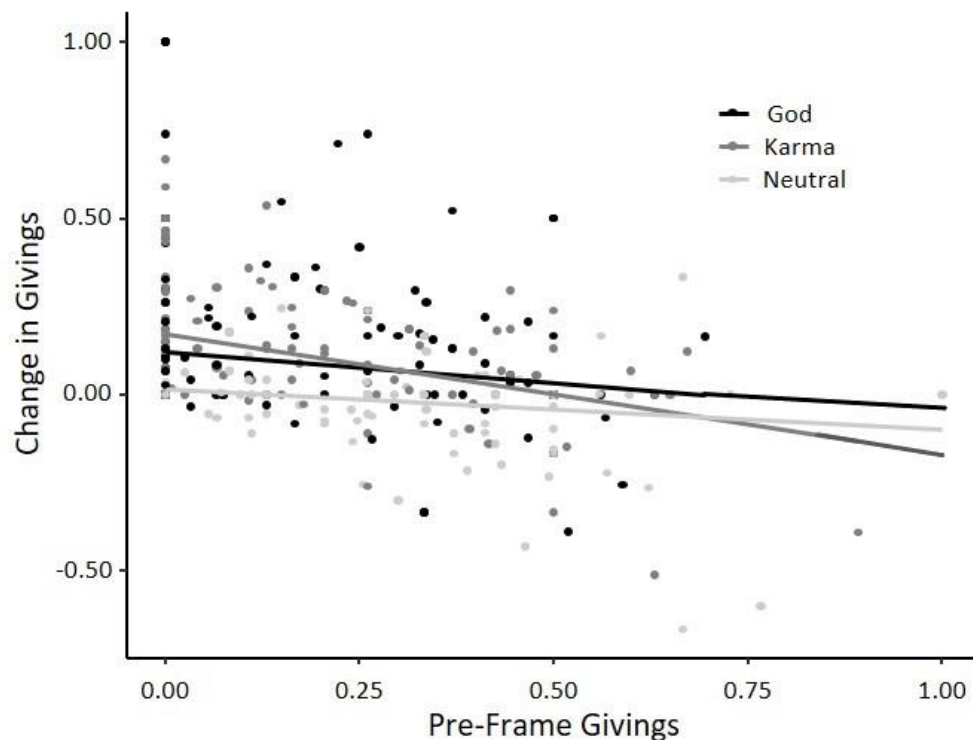
Figure 3. Distribution of dictator game giving in Experiment 1, before and after supernatural framing.



We next investigated whether participants' baseline levels of generosity moderated the effect of supernatural framing on giving. As hypothesized, there was a negative association between participants' pre-frame giving and their change in giving (i.e., post-frame minus pre-frame giving) after supernatural framing,  $r = -.26$ , 95% CI  $[-.33, -.19]$ ,  $p < .001$ . As can be seen in Figure 4, we found that participants who were initially selfish (i.e., gave nothing away) became more generous after thinking about karma ( $M_{change} = 0.16$  [0.13, 0.21]) or God ( $M_{change} = .11$  [0.07, 0.16]), while participants who were initially fair (i.e., divided the money exactly in half) did not change their strategy, but remained fair after thinking about karma ( $M_{change} = 0.0001$  [-0.02, 0.01]) or God ( $M_{change} = 0.02$  [-0.002, 0.06]). Rather than increasing giving among all

participants (which was possible, since giving away 50% does not actually reflect the ceiling on the scale), supernatural framing encouraged adherence to the normative (i.e., modal) prosocial response by increasing giving among initially-selfish participants and not affecting the behavior of initially-fair participants.

*Figure 4. Initial giving (pre-framing) predicting change in giving after supernatural framing in Experiment 1. Dots reflect data points for each participant, with lines summarizing this relationship within each condition.*



### Exploratory Analyses: Beliefs about God and Karma

We used mixed-effects models to explore whether individual differences in beliefs about God and karma predicted DG giving or moderated the supernatural framing effect. We conducted separate analyses for each potential moderator and each framing condition. As can be seen in Table 2, there was a small, marginally-significant association between belief in God and greater baseline giving (Model 1a), but belief in God did not significantly moderate the God frame effect. Belief in karma did not predict giving or moderate framing effects (Model 2a). In

this sample the supernatural framing effect did not depend on participants' level of belief, which can be explained by the fact that we recruited only believers for this experiment.

Viewing God/karma as punitive (Models 1b and 2b) or benevolent (Models 1c and 2c) was also only weakly and non-significantly associated with giving and did not moderate the effect of either supernatural frame. It is also notable that participants tended to view God as highly benevolent ( $M = 4.64$ ,  $SD = 0.79$ , on a 5-point scale) and not punitive ( $M = 2.44$ ,  $SD = 1.25$ ), providing evidence against the idea that belief in supernatural *punishment* is required for supernatural primes or frames to influence behavior. Views of karma's traits were less skewed towards benevolence ( $M = 3.12$ ,  $SD = 1.21$ ) or punitiveness ( $M = 3.16$ ,  $SD = 1.15$ ), but also did not significantly predict giving or moderate the framing effect. In contrast to these non-punitive trait ratings, in open-ended descriptions many participants did list greed/selfishness/unhelpfulness as something that would be punished by God (20% of God frame participants) or karma (38% of Karma frame participants). Even more participants reported that generosity would be rewarded by God (36%) or karma (78%), indicating that many participants do believe that selfishness or generosity can elicit supernatural consequences. But these ratings did not consistently predict giving. Participants who reported that karma punishes greed were slightly more likely to increase giving after framing (Model 2d), but participants who reported that God punishes greed were slightly *less* likely to increase giving after framing (Model 1d), and reports that God or karma rewards generosity did not predict greater giving (Models 1e and 2e). Therefore, participants' belief in punishing supernatural forces, as indexed by trait ratings or freely generated statements that God/karma will reward and punish generosity and greed, did not clearly predict dictator game giving in this experiment.

Finally, we explored the hypothesis that the supernatural framing effect could have affected participants' responses because thinking about karma or God might have prompted believers to signal their religious identities by acting prosocially. If this were the case, then thinking about God and karma should affect behavior most strongly for participants who associate this concept with their religious affiliation. While 81% of participants in the God frame condition identified themselves as Christians (i.e., a religion associated with belief in God), most participants in the Karma frame condition reported either a religious affiliation unassociated with karma (e.g., Christianity, 58%) or reported no religious affiliation at all (atheists, agnostics and the non-religious, 30%). Further contrary to the religious signalling hypothesis, participants' history of learning about God/karma from social sources (e.g., religious sources, friends and family members) did not moderate the effect of the God frame (interaction  $b = 0.004$ ,  $p = .77$ ) or Karma frame (interaction  $b = 0.013$ ,  $p = .28$ ) on giving. Additionally, participants' religiosity did not significantly moderate the effect of the God frame (interaction  $B = 0.013$ ,  $p = .33$ ) or Karma frame (interaction  $b = -0.021$ ,  $p = .091$ , see Supplemental Materials for full models). Therefore, we found no evidence that the priming effect depended on the association between God/karma and participants' religious affiliation or group identities.

*Table 2. Mixed-effects model predicting dictator game giving from individual differences in a variety of supernatural beliefs in Experiment 1.*

God Frame Condition										
	Model 1a: Belief in God		Model 1b: God is Punitive		Model 1c: God is Benevolent		Model 1d: God Punishes Greed		Model 1e: God Rewards Generosity	
	<i>B</i> [95% CI]	<i>p</i>	<i>B</i> [95% CI]	<i>p</i>	<i>B</i> [95% CI]	<i>p</i>	<i>B</i> [95% CI]	<i>p</i>	<i>B</i> [95% CI]	<i>p</i>
Intercept	0.193	<.001	0.193	<.001	0.193	<.001	0.198	<.001	0.191	<.001
	[0.165, 0.220]		[0.165, 0.220]		[0.165, 0.220]		[0.167, 0.229]		[0.157, 0.225]	
Pre- vs. Post-Frame	0.087	<.001	0.087	<.001	0.087	<.001	0.101	<.001	0.078	<.001
	[0.061, 0.112]		[0.061, 0.112]		[0.061, 0.112]		[0.073, 0.130]		[0.046, 0.110]	
Belief	0.025	.076	0.004	.77	0.021	.13	-0.027	.44	0.005	.86
	[-0.002, 0.052]		[-0.023, 0.032]		[-0.006, 0.049]		[-0.095, 0.041]		[-0.052, 0.062]	
Frame*Belief	0.014	.28	-0.004	.76	0.005	.71	-0.072	.027	0.025	.36
	[-0.011, 0.040]		[-0.030, 0.022]		[-0.021, 0.030]		[-0.136, -0.009]		[-0.029, 0.078]	
N	254		254		254		254		254	
AICc	-1505.06		-1499.95		-1502.58		-1509.84		-1503.69	
Karma Frame Condition										
	Model 2a: Belief in Karma		Model 2b: Karma is Punitive		Model 2c: Karma is Benevolent		Model 2d: Karma Punishes Greed		Model 2e: Karma Rewards Generosity	
	<i>B</i> [95% CI]	<i>p</i>	<i>B</i> [95% CI]	<i>p</i>	<i>B</i> [95% CI]	<i>p</i>	<i>B</i> [95% CI]	<i>p</i>	<i>B</i> [95% CI]	<i>p</i>
Intercept	0.184	<.001	0.185	<.001	0.185	<.001	0.184	<.001	0.163	<.001
	[0.157, 0.212]		[0.157, 0.213]		[0.157, 0.212]		[0.149, 0.219]		[0.104, 0.222]	
Pre- vs. Post-Frame	0.109	<.001	0.110	<.001	0.110	<.001	0.090	<.001	0.092	<.001
	[0.085, 0.134]		[0.086, 0.134]		[0.086, 0.134]		[0.060, 0.121]		[0.040, 0.144]	
Belief	0.004	.79	-0.016	.27	0.027	.060	0.002	.96	0.027	.43
	[-0.024, 0.031]		[-0.043, 0.012]		[-0.001, 0.054]		[-0.056, 0.059]		[-0.040, 0.094]	
Frame*Belief	0.016	.20	0.003	.80	0.019	.12	0.050	.048	0.022	.46
	[-0.008, 0.040]		[-0.021, 0.027]		[-0.005, 0.043]		[0.001, 0.100]		[-0.037, 0.081]	
N	250		249		249		250		250	
AICc	-1602.44		-1590.39		-1599.00		-1607.70		-1605.54	

*Note.* Each model description specifies the particular belief included as a predictor in that model. Belief, punitiveness, and benevolence were standardized; free lists were coded as 1 if greed/generosity was mentioned at least once, and 0 if never mentioned.

## EXPERIMENT 2

Experiment 1 found that thinking about karma or God led to decreased selfishness among believers who initially displayed selfish behavior, compared to when believers were not thinking about supernatural forces. In Experiment 2, we sought to replicate these findings in a new sample of participants, selected based on their religious affiliation rather than their expressed supernatural beliefs. Cultural evolutionary theories of prosocial religions highlight the importance of cultural linkages between the supernatural with the moral in the scaling up of human cooperation. Belief in karma has been proposed to play an important role in regulating prosocial behavior in groups dominated by karma-centred religious traditions (e.g., Hinduism and Buddhism through Asia, Norenzayan et al., 2016; White, Sousa, & Prochownik, 2016). In this study we therefore investigate whether thinking about karma can increase prosocial behavior among Hindus and Buddhists. For the sake of comparison, we also recruited a sample of Christians and reminded them of God using the same procedures.

### Methods

Before conducting this study, all methods, research questions, and analysis plans were pre-registered on OSF, and can be accessed at

[https://osf.io/2jyde/?view\\_only=669c0e0415254e6594dddb13fdb9beb1](https://osf.io/2jyde/?view_only=669c0e0415254e6594dddb13fdb9beb1).

### Participants

We recruited participants from the USA, in March 2017, through Qualtrics's online panels. This recruitment method allowed us to target a sample with specific religious affiliations (recruitment materials did not mention God, karma, or religion). A power analysis based on an estimated effect size of  $d = .30$  (comparable to the effect sizes found in Experiment 1) indicated

that a minimum sample size of 119 was required to detect a within-subjects effect with  $>.90$  power. We increased the sample size to 200 participants per condition to account for the possibility of lower-than-expected effect sizes and to have sufficient statistical power for analyses of individual differences. A sensitivity power analysis indicated that this sample size had 80% power to detect an effect size as small as  $d = 0.20$  in a two-tailed paired-samples t-test or to detect small correlations ( $r = 0.20$ ) between variables of interest.

As specified in the pre-registration, we excluded individuals who reported a religious affiliation other than Hindu, Buddhist, or Christian in the prescreening survey ( $n = 197$ ). As preregistered, we also excluded inattentive individuals who failed an attention check question placed within the survey ( $n = 221$ ), took less than 1/3 the median time to complete the survey ( $n = 5$ ), and those who were directed to the full-length survey, but failed to complete it: 51 did not complete the DG questions, 283 answered the DG questions but did not complete the entire survey (attrition rates did not significantly differ across affiliations,  $N_{Hindu} = 117$ ,  $N_{Buddhist} = 105$ ,  $N_{Christian} = 116$ ,  $\chi^2(2) = 0.79$ ,  $p = .68$ ). Primary findings remain unchanged when these excluded participants are included in the total sample (see Supplemental Material for these additional analyses).

The final sample (Table 1) of Christians ( $n = 203$ ) were primarily Caucasian (85%) and expressed strong belief in God and low belief in karma. Hindus ( $n = 200$ ) were primarily Asian (92%) and expressed strong belief in both God and karma. Buddhists ( $n = 204$ ) were primarily Asian (52%) or Caucasian (37%) and expressed greater belief in karma than belief in God.

## Materials and Procedure

Participants completed the same prescreening, repeated dictator game, and supernatural belief and demographic questionnaires described in Experiment 1, with two differences. First,



the Neutral condition was dropped. Experiment 1 did not show any evidence of order effects and participant recruitment was much more expensive for this sample, therefore we conserved resources by dropping the neutral frame condition. Second, participants were selected and assigned to framing conditions based on their religious affiliation, rather than their level of belief. Participants who identified themselves as Hindus and Buddhists in the prescreening survey were asked to think about karma during the second phase of the dictator game, and participants who identified themselves as Christians were asked to think about God. Second, the dictator game endowments (\$2.00, \$3.00, or \$4.00) were substantially larger than the endowments in Experiment 1, but the amount again allowed participants to approximately double their earnings from completing this survey. Patterns of giving were again very consistent across trials, before framing ( $\alpha = .94$ ) and after framing ( $\alpha = .96$ ). After the dictator game, participants completed various measures of beliefs, including belief in karma and God, ratings of supernatural benevolence and punitiveness, free list of actions with supernatural punishments and rewards, and exposure to social sources of belief (see pre-registration documents).

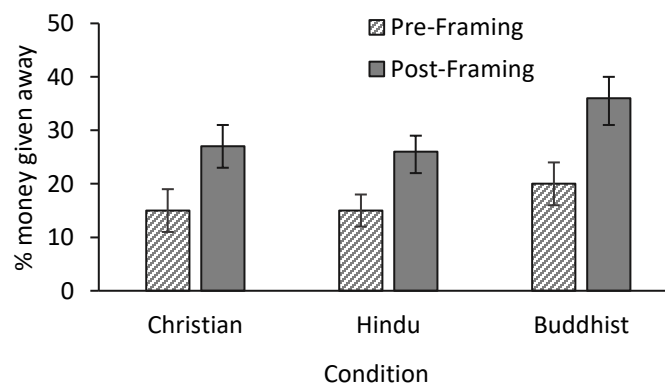
## **Results and Discussion**

### **Confirmatory Analyses: Supernatural Framing Manipulation**

We used mixed-effects models to assess whether supernatural framing (0 = pre-frame, 1 = post-frame) increased giving for each religious group (dummy coded with Christians as the reference group), compared to participants' baseline levels of generosity. We included random intercepts and random effects of framing nested within participant to account for the repeated-measures design. Confirming the results of Experiment 1, participants gave more after thinking about karma or God,  $b = 0.121$ , 95% CI [0.085, 0.154], and this framing effect did not significantly differ across the different religious groups (Christian vs. Hindu frame effect:  $b = -$

0.013 [-0.066, 0.039],  $p = .61$ , Christian vs. Buddhist frame effect:  $b = 0.040$  [-0.010, 0.092],  $p = .13$ ). As can be seen in Figure 5, Hindus,  $d = 0.48$  [0.28, 0.68],  $t(199) = 6.83$ ,  $p < .001$ , and Buddhists,  $d = 0.52$  [0.33, 0.73],  $t(203) = 7.56$ ,  $p < .001$ , became gave more after thinking about karma. Similarly, Christians gave more after thinking about God,  $d = 0.48$  [0.28, 0.68],  $t(202) = 6.86$ ,  $p < .001$ . Additionally, Buddhists were slightly more generous overall than Hindus ( $b = 0.052$ ,  $p = .040$ ) and Christians ( $b = 0.057$ ,  $p = .025$ ), an effect that exploratory analyses revealed was driven by greater giving among Buddhist converts (although the extent of self-reported learning about God/karma from religious and social sources did not moderate the framing effect in any religious group). This supernatural framing effect remained when controlling for the amount of money distributed in each trial (pre- vs. post-frame effect:  $b = 0.122$ ,  $p < .001$ ), or participants' perceptions about the purpose of the experiment and their familiarity with DG tasks (frame effect:  $b = 0.099$ ,  $p = .011$ ). Moreover, the effect held even when including all data from participants initially omitted from the final sample due to exclusion criteria (see Supplemental Material for details of these alternative analyses).

*Figure 5. Mean proportion of money given away in Experiment 2, before and after supernatural framing (God for the Christian sample, karma for the Hindu and Buddhist samples). Error bars indicate 95% confidence intervals around the mean.*



We next investigated whether baseline selfishness moderated these effects. Replicating Experiment 1, there was an overall negative association between participants' initial giving and their change in giving after framing,  $r = -.26$ , 95% CI  $[-.34, -.19]$ ,  $p < .001$ . Participants who were initially selfish became more generous when thinking about karma (Hindus:  $M_{\text{change}} = 0.14$  [0.10, 0.19]; Buddhists:  $M_{\text{change}} = 0.23$  [0.17, 0.29]) or God ( $M_{\text{change}} = 0.15$  [0.11, 0.20]), while those who initially exhibited the normative, modal prosocial response (i.e., fairness) did not change their strategy, but remained equally fair when thinking about karma (Hindus:  $M_{\text{change}} = 0.02$  [0.00, 0.06]; Buddhists:  $M_{\text{change}} = 0.02$  [-0.04, 0.09]) or God ( $M_{\text{change}} = 0.04$  [-0.04, 0.13]).

### **Exploratory Analyses: Beliefs about Karma and God**

We used mixed-effects models to explore whether individual differences in beliefs about karma and God predicted DG giving or moderated the supernatural framing effect. As can be seen in Table 3, level of belief in karma or God was not associated with levels of giving and did not moderate the supernatural framing effect (Models 3a, 4a, and 5a). As in Experiment 1, this may be caused by the restricted range of belief that resulted from our strategy of recruiting participants from religious groups where God and karma are relevant.

In this experiment, Christians who viewed God as more benevolent and less punitive were slightly *less* generous at baseline, but *more* likely to increase their giving when thinking about God (Models 3b and 3c), lending inconsistent evidence of how supernatural benevolence and punitiveness predicts giving. There was also high consensus among Christians that God is extremely benevolent ( $M = 4.76$ ,  $SD = 0.63$  on a 5-point scale) and non-punitive ( $M = 2.24$ ,  $SD = 1.12$ ), indicating that belief in a punishing God is not required for supernatural framing to affect behavior. Ratings of karma's benevolence ( $M_{\text{Hindu}} = 3.82$ ,  $SD = 1.13$ ;  $M_{\text{Buddhist}} = 3.83$ ,  $SD = 1.16$ )

and punitiveness ( $M_{\text{Hindu}} = 2.79$ ,  $SD = 1.15$ ;  $M_{\text{Buddhist}} = 2.67$ ,  $SD = 1.27$ ) were less skewed, but did not significantly predict giving or moderate the framing effect for Hindus or Buddhists.

Participants were much more willing to admit that God or karma will punish selfishness/greed and reward generosity. Selfishness/greed was mentioned by 22% of Christians, 33% of Hindus, and 38% of Buddhists, and generosity was mentioned by 49% of Christians, 67% of Hindus, and 71% of Buddhists. Supernatural punishments for greed did not predict nor moderate DG giving in these samples, but supernatural rewards for generosity did. Christians (Model 3e) and Hindus (Model 4e) who listed generosity were more likely to increase giving after framing, compared to those who did not mention generosity. Among Buddhists (Model 5e), listing generosity did not moderate the framing effect, but it was associated with greater baseline giving. Overall, these results support the general lack of an association between strength of belief and giving, but these exploratory analyses offered preliminary evidence that beliefs about God/karma's willingness to reward generous behavior may predict greater giving.

*Table 3. Mixed-effects model predicting dictator game giving from individual differences in a variety of supernatural beliefs in Experiment 2.*

Christians										
	Model 3a: Belief in God		Model 3b: God is Punitive		Model 3c: God is Benevolent		Model 3d: God Punishes Greed		Model 3e: God Rewards Generosity	
	<i>B</i> [95% CI]	<i>p</i>	<i>B</i> [95% CI]	<i>p</i>	<i>B</i> [95% CI]	<i>p</i>	<i>B</i> [95% CI]	<i>p</i>	<i>B</i> [95% CI]	<i>p</i>
Intercept	0.145 [0.113, 0.177]	<.001	0.145 [0.113, 0.177]	<.001	0.145 [0.113, 0.177]	<.001	0.142 [0.106, 0.179]	<.001	0.144 [0.099, 0.189]	<.001
Pre- vs. Post-Frame	0.121 [0.086, 0.155]	<.001	0.121 [0.086, 0.155]	<.001	0.121 [0.086, 0.155]	<.001	0.118 [0.079, 0.157]	<.001	0.074 [0.027, 0.121]	.003
Belief	-0.019 [-0.051, 0.013]	.25	0.025 [-0.007, 0.057]	.13	-0.039 [-0.071, -0.007]	.017	0.012 [-0.066, 0.091]	.76	0.002 [-0.063, 0.067]	.95
Frame*Belief	0.017 [-0.018, 0.051]	.34	-0.037 [-0.071, -0.003]	.036	0.040 [0.006, 0.074]	.022	0.010 [-0.074, 0.094]	.81	0.096 [0.028, 0.163]	.006
N	203		203		203		203		203	
AICc	-796.16		-799.93		-803.34		-798.05		-805.07	
Hindus										
	Model 4a: Belief in Karma		Model 4b: Karma is Punitive		Model 4c: Karma is Benevolent		Model 4d: Karma Punishes Greed		Model 4e: Karma Rewards Generosity	
	<i>B</i> [95% CI]	<i>P</i>	<i>B</i> [95% CI]	<i>P</i>	<i>B</i> [95% CI]	<i>p</i>	<i>B</i> [95% CI]	<i>p</i>	<i>B</i> [95% CI]	<i>p</i>
Intercept	0.150 [0.117, 0.182]	<.001	0.150 [0.117, 0.182]	<.001	0.150 [0.117, 0.182]	<.001	0.133 [0.094, 0.173]	<.001	0.148 [0.092, 0.205]	<.001
Pre- vs. Post-Frame	0.107 [0.077, 0.138]	<.001	0.107 [0.076, 0.138]	<.001	0.107 [0.076, 0.138]	<.001	0.112 [0.075, 0.150]	<.001	0.060 [0.007, 0.113]	.026
Belief	-0.004 [-0.037, 0.028]	.79	-0.008 [-0.041, 0.025]	.64	0.006 [-0.026, 0.039]	.71	0.050 [-0.019, 0.119]	.16	0.002 [-0.067, 0.071]	.95
Frame*Belief	0.023 [-0.008, 0.053]	.15	0.004 [-0.027, 0.034]	.82	-0.004 [-0.035, 0.026]	.78	-0.016 [-0.081, 0.050]	.64	0.071 [0.006, 0.135]	.033
N	200		200		200		200		200	
AICc	-866.04		-864.22		-864.15		-869.00		-871.89	

	Buddhists									
	Model 5a: Belief in Karma		Model 5b: Karma is Punitive		Model 5c: Karma is Benevolent		Model 5d: Karma Punishes Greed		Model 5e: Karma Rewards Generosity	
	<i>B</i> [95% CI]	<i>p</i>	<i>B</i> [95% CI]	<i>p</i>	<i>B</i> [95% CI]	<i>p</i>	<i>B</i> [95% CI]	<i>p</i>	<i>B</i> [95% CI]	<i>p</i>
Intercept	0.202 [0.162, 0.241]	<.001	0.202 [0.162, 0.241]	<.001	0.202 [0.162, 0.241]	<.001	0.185 [0.135, 0.235]	<.001	0.122 [0.050, 0.195]	.001
Pre- vs. Post-Frame	0.160 [0.119, 0.202]	<.001	0.160 [0.119, 0.202]	<.001	0.160 [0.119, 0.202]	<.001	0.142 [0.089, 0.194]	<.001	0.169 [0.092, 0.247]	<.001
Belief	0.018 [-0.021, 0.058]	.37	-0.015 [-0.055, 0.024]	.45	0.000 [-0.039, 0.040]	.99	0.045 [-0.036, 0.127]	.28	0.112 [0.026, 0.198]	.012
Frame*Belief	0.012 [-0.030, 0.053]	.59	0.004 [-0.037, 0.046]	.84	0.027 [-0.015, 0.068]	.21	0.049 [-0.036, 0.135]	.26	-0.012 [-0.104, 0.079]	.79
N	204		204		204		204		204	
AICc	-546.59		-545.56		-546.79		-551.57		-554.89	

*Note.* Each model description specifies the particular belief included as a predictor in that model. Belief, punitiveness, and benevolence were standardized; free lists were coded as 1 if greed/generosity was mentioned at least once, and 0 if never mentioned.

### EXPERIMENT 3

Experiments 1 and 2 found that thinking about God and karma decreased selfishness among believers. Individual differences in supernatural belief did not moderate this effect, potentially due to the restricted range of belief in these samples: We purposefully had excluded non-believers or asked participants to think about a supernatural concept that was relevant to their religious traditions, and the effectiveness of supernatural framing did not differ between those who somewhat agree or strongly agree that God/karma exists. In Experiment 3, we recruited a sample that included both believers and non-believers, to assess whether those who explicitly deny the existence of supernatural forces are also affected by our supernatural framing manipulation. Evidence that explicit beliefs moderate the supernatural framing effect would also speak against alternative explanations for our findings. Since believers and non-believers both understand that God and karma are entities that care about prosocial human norms (White & Norenzayan, 2019), they should be similarly influenced by experimenter demand and thoughts about morality primed by these supernatural concepts. Differential patterns of behavior for believers and non-believers would undermine the alternative that supernatural framing effect are attributable to experimenter demand and instead supports the explanation that the culturally-learned belief in supernatural intervention for good and bad behavior is a key component of the supernatural framing effect.

### Methods

Before conducting this study, all methods, research questions, and analysis plans were uploaded to OSF. However, as they were not correctly registered, this document was accidentally deleted after data collection. The original and unedited copy of the intended pre-

registration was re-uploaded, and can be found at

[https://osf.io/69b4n/?view\\_only=94f3fa9dc6b04491bc85cdb305c942fe](https://osf.io/69b4n/?view_only=94f3fa9dc6b04491bc85cdb305c942fe)<sup>5</sup>. The recruitment

method, analysis plan, and hypotheses are consistent with those pre-registered for Experiments 1 and 2—which were designed, registered and conducted prior to this study—with the exception that non-believers were also included in the sample for Experiment 3.

## Participants

We recruited American participants from MTurk to participate in an online survey, in March 2017, and, unlike in previous studies, participants were not pre-screened for supernatural beliefs or religious affiliations; everyone interested in completing the survey was allowed to participate. Given that in Experiment 1 approximately half of interested participants were screened out for being non-believers, in Experiment 3 we doubled the sample size per condition, in order to include approximately the same number of believers per condition as in Experiment 1. We aimed to recruit 500 participants for each of the two supernatural framing conditions (1000 participants total). Similar to Experiments 1 & 2, we followed preregistered criteria by excluding participants who did not complete the survey (i.e., did not reach the end of the survey or did not provide an answer to all six DG trials,  $n = 48$ ), or who failed an attention check question placed within the survey ( $n = 15$ ). Furthermore, we had initially proposed excluding participants who completed the study in less than 5 minutes, as we believed they would not be able to adequately read instructions and respond in that little time. However, the median completion time (6.5 minutes) was much shorter than anticipated. Therefore, this exclusion criterion was dropped. Primary analyses were not significantly changed if this criterion was kept (see Supplemental Material).

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<sup>5</sup> This is an anonymized version intended for the purposes of review, which will be updated to the original non-anonymized version if accepted for publication.



The final sample of participants ( $N = 986$ ) was randomly assigned to either the God framing condition or the karma framing condition, regardless of belief. There was no difference across conditions in participants' belief in God or belief in karma. The God framing condition ( $n = 498$ ) included 295 believers and 203 non-believers (according to a binary measure of belief in God). The Karma framing condition ( $n = 488$ ) included 248 individuals high in belief and 240 individuals low in belief (according to a median split of the belief in karma questionnaire scores). Further details of sample demographics can be found in Table 1. A sensitivity power analysis indicated that these sample sizes have 80% power to detect an interaction of  $\eta_p^2 = 0.02$  (in an ANOVA) between the within-subject supernatural framing effect and between-subjects differences in supernatural belief.

### **Materials and Procedure**

Participants completed the same repeated dictator game and supernatural belief and demographic questionnaires described in Experiment 1, except that in this experiment participants were not pre-screened prior to the dictator game, and were instead randomly assigned to either God or Karma framing conditions. We also slightly altered the supernatural framing instructions to make them meaningful to both believers and non-believers, by removing the reference to "your belief" and instead instructing participants: "Before you make these decisions, please think about God [karma]." After completing the dictator game, participants reported various aspects of their religious beliefs and other demographics, including measures of God/karma's benevolent and punitive traits (although participants did not complete the free list task in this experiment). Our analyses below focus on two measures of belief: a continuous measure of belief in God (1 item, "I believe that god exists," 1 = *Strongly Disagree* to 9 =

*Strongly Agree*) and a continuous composite measure of belief in karma (16-item scale,  $\alpha = .94$ , White et al., In press). All materials are described in the pre-registration documents.

## Results and Discussion

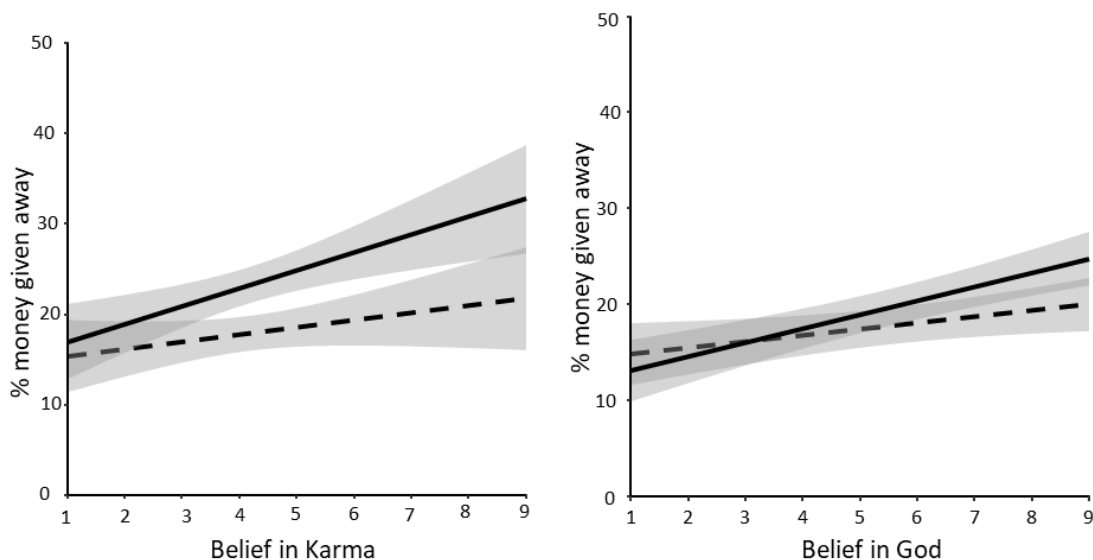
### Confirmatory Analyses: Supernatural Framing Manipulation

We used the same mixed-effect modeling strategy as in Experiments 1 and 2, but also included a continuous measure of belief in God or karma (standardized within each belief type) as possible moderator. A model including all possible interactions revealed no main effect of condition,  $b = -0.006$ , 95% CI  $[-0.034, 0.026]$ ,  $p = .68$ , and a small association between level of belief and baseline giving in this sample,  $b = 0.025$   $[0.004, 0.047]$ ,  $p = .017$ , which did not differ by condition, interaction  $b = -0.004$   $[-0.035, 0.026]$ ,  $p = .77$ . There was also a small overall framing effect,  $b = 0.022$   $[0.007, 0.037]$ ,  $p = .003$ , which did differ by condition such that karma caused greater increases in giving than God,  $b = 0.039$   $[0.019, 0.060]$ ,  $p < .001$ ; and the predicted interaction between level of belief and the supernatural framing effect,  $b = 0.033$   $[0.018, 0.048]$ ,  $p < .001$ , which did not significantly differ between the God and karma framing conditions,  $b = -0.012$   $[-0.033, 0.008]$ ,  $p = .26$ . The nature of this interaction is displayed in Figure 6.

Replicating the results of Experiments 1 and 2, those who believe in karma gave more when thinking about karma, although as predicted this increase in giving was greater for believers,  $d = 0.46$ , 95% CI  $[0.28, 0.64]$ ,  $t(233) = 7.04$ ,  $p < .001$ , than for non-believers,  $d = 0.26$ , 95% CI  $[0.08, 0.43]$ ,  $t(253) = 4.13$ ,  $p < .001$ . As can be seen in Figure 6, the Karma framing effect was virtually nonexistent for those who strongly deny the existence of karma. Additionally, those who believe in God gave more when thinking about God,  $d = 0.26$ , 95% CI  $[0.10, 0.42]$ ,  $t(294) = 4.46$ ,  $p < .001$ , but as predicted, non-believers did not. In fact, they gave slightly less when thinking about God,  $d = -0.15$ , 95% CI  $[-0.34, 0.05]$ ,  $t(203) = -2.10$ ,  $p = .037$ .

This interaction between belief and framing also remained when controlling for the amount of money distributed in each trial (belief\*framing interaction:  $b = 0.033$ ,  $p < .001$ ), participants' view of supernatural benevolence/punitiveness (belief\*framing interaction:  $b = 0.030$ ,  $p < .001$ ), participants' perceptions about the purpose of the experiment, and when including all data from participants initially omitted from the sample (see Supplemental Material). The interaction between belief and framing also remained when using a single-item measure of belief in karma (Karma belief\*framing interaction:  $b = 0.03$ ,  $p < .001$ ) or a binary measure of belief in God (God belief\*framing interaction:  $b = 0.05$ ,  $p = .004$ ). Additionally, as in Experiment 1, the supernatural framing effect was not moderated by participants' view of God or karma's benevolence,  $b = 0.005$ ,  $p = .60$ , or punitiveness,  $b = -0.001$ ,  $p = .90$ . These results replicate the main supernatural framing results among believers from Experiments 1 and 2, and further demonstrate that explicit commitment to belief moderates this framing effect: The effect of thinking about God on giving disappeared and the effect of thinking about karma was greatly diminished for non-believers.

Figure 6. Proportion of money given away in Experiment 3, before (dashed line) and after (solid line) reminders of karma (left) and God (right), with 95% confidence bands.



Participants' initial generosity was again a moderator for these effects. As in Experiments 1 and 2, there was an overall negative association between participants' initial giving and their change in giving after framing,  $r = -.29$ , 95% CI  $[-.34, -.23]$ ,  $p < .001$ . The supernatural framing manipulation only affected the behavior of believers who were initially selfish (Karma frame:  $M_{\text{change}} = 0.13$ , 95% CI  $[0.10, 0.17]$ ; God frame:  $M_{\text{change}} = 0.09$ , 95% CI  $[0.06, 0.12]$ ), not those who were initially fair (Karma frame:  $M_{\text{change}} = 0.01$ , 95% CI  $[-0.004, 0.03]$ ; God frame:  $M_{\text{change}} = -0.01$ , 95% CI  $[-0.04, 0.02]$ ).

## EXPERIMENT 4

Experiment 3 replicated the supernatural framing effect and moderation by baseline giving among a new sample of believers, but found that this effect was substantially reduced among non-believers. Experiment 4 aimed to replicate the karma framing effect and the interaction with explicit karma belief in a more traditional one-shot, between-subjects dictator game. Replicating our effects in a between-subjects design provides further confidence that results are not simply due to experimental demand effects (which ought to be diminished in a between-subjects design). We also included additional measures of beliefs about karma and beliefs about a just world, to further explore potential moderators of our experimental effects.

## Methods

Before conducting this study, all methods, research questions, and analysis plans were uploaded to OSF: [https://osf.io/m7w9t/?view\\_only=a7bcaa6b55a44cab81ef4385aa827418](https://osf.io/m7w9t/?view_only=a7bcaa6b55a44cab81ef4385aa827418).

## Participants

We recruited participants from the USA, in February 2019, through Qualtrics's online panels. We aimed to recruit a sample of 1000 participants. According to power analyses conducted using the pwr package in R, a sample size of 596 participants would be required to

have 80% power to detect a small between-condition difference ( $d = 0.23$ , i.e., the lower-limit of the within-subjects effect detected in Experiment 3). Additional power analyses conducted using the *simr* package in R (based on data from Experiments 1 and 3), indicated that a sample of 1000 participants would be required to have approximately 80% power to detect a reasonably small between-subjects interaction (i.e.,  $b = 0.04$ ) between belief in karma and condition. We followed preregistered criteria by excluding participants who did not complete the survey ( $n = 13$ ) or who failed an attention check question ( $n = 521$ ). As preregistered, we also included extra participants in our sample (beyond the planned size) who completed the survey prior to data collection being terminated by Qualtrics panel managers. The final sample of participants was randomly assigned to either the Karma framing condition ( $n = 629$ ) or a control condition ( $n = 615$ ), regardless of belief. Further details of sample demographics can be found in Table 1.

### **Materials and Procedure**

Participants were randomly assigned to complete a single trial of the dictator game, in which they were asked to divide \$2.00 between themselves and another participant, according to neutrally-framed instructions or according to instructions to “think about Karma.” For analysis, responses were transformed into the proportion of money given away. (Due to the expense of participant recruitment, we did not include a God framing condition, but rather focused on the more novel karma framing effect compared to neutrally-framed instructions.)

Participants then reported their familiarity with dictator game-type tasks, provided an open-ended guess about the experimental hypothesis, and then completed the 16-item belief in karma questionnaire ( $\alpha = .92$ ). After the dictator game, participants completed various measures of beliefs and demographics (see pre-registration documents), including additional questions about whether karma rewards and punishes behavior (mean of two items,  $r = .72$ , “Karma

punishes people for their behavior,” “Karma rewards people for proper behavior”), whether karma is otherwise benevolent (mean of two items,  $r = .68$ , “Karma is loving,” “Karma is forgiving”), and karma’s knowledge (mean of two items,  $r = .68$ , “Karma can see what people are doing, even if they are far away in a foreign country,” “Karma can see into people's hearts and know their thoughts and feelings”).

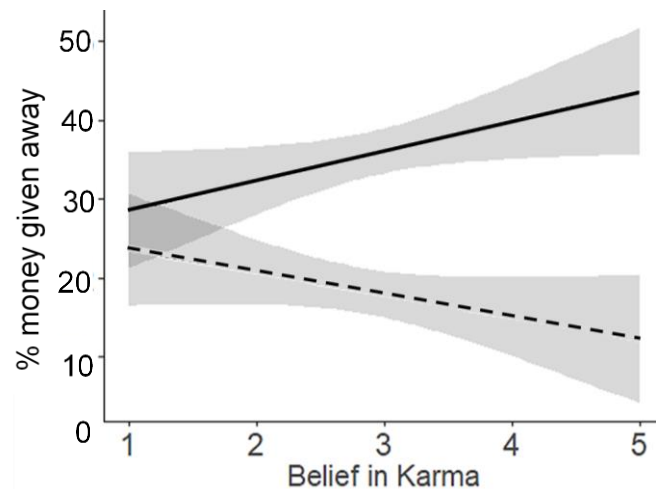
## Results and Discussion

### Confirmatory Analyses: Supernatural Framing Manipulation

Participants asked to think about karma were more generous overall than were participants in the control condition, who were not reminded of karma,  $d = 0.48$ , 95% CI [0.37, 0.60],  $t(1218) = 8.51$ ,  $p < .001$ . Replicating the pattern from Experiment 3, a linear regression including experimental condition, participants’ level of explicit belief in karma (standardized), and their interaction, revealed that this experimental effect,  $b = 0.17$  [0.13, 0.21],  $p < .001$ , was stronger among participants who believed in karma more,  $b = 0.05$  [0.01, 0.09],  $p = .010$ . As depicted in Figure 7, although there was no main effect of belief in karma, the experimental reminder of karma increased giving among participants who expressed some belief in karma, but not among those who strongly denied the existence of karma. When reminded of karma, there was a small positive association between belief and giving,  $b = 0.03$  [0.002, 0.06],  $p = .04$ , whereas belief in karma was not significantly associated with giving in the control condition,  $b = -0.02$  [-0.05, 0.006],  $p = .11$ . This experimental effect was robust when controlling for hypothesis guessing, which was unassociated with giving,  $b = 0.00$ ,  $p = .95$ , and did not moderate the framing effect,  $b = 0.01$ ,  $p = .68$ . Moreover, game familiarity was not a factor as participants overwhelmingly (94%) reported no prior exposure to economic games. It is also notable that this between-subjects experimental effect is as large as that found in the within-subjects design used

in Experiments 1-3. Altogether, these factors suggest that participants' responses in each experiment are not solely driven by their acquiescence to (potential) experimental demand effects.

*Figure 7. Proportion of money given away in Experiment 4, when thinking about karma (solid line) and when not thinking about karma (dashed line), with 95% confidence bands.*



### Exploratory Analyses: Alternative moderators

We further explored why belief in karma decreased selfishness, we examined several alternative individual differences as possible moderators of the supernatural framing effect. One possibility is that experimental reminders of karma simply primed ideas about justice, fairness, or reciprocity in participants. However, individual differences in belief in a just world (the expectation of fairness in secular, interpersonal contexts) did not predict giving,  $b = 0.006$ , 95% CI  $[-0.02, 0.04]$ ,  $p = .71$ , nor moderate the karma framing effect,  $b = 0.007$   $[-0.03, 0.05]$ ,  $p = .74$ , implying that beliefs about karma are not merely reducible to ideas about (non-supernatural) interpersonal fairness. Instead, the karma framing effect was associated with beliefs about karma's ability to reward and punish behavior: Among participants in the karma framing condition (but not in the control condition), giving was weakly but significantly correlated with

belief that karma rewards good behavior,  $r = .12$  [.04, .19],  $p = .003$ , or punishes bad behavior,  $r = .09$  [.01, .16],  $p = .029$ . Giving was not significantly associated with other aspects of karma that are less directly moralistic, such as the view that karma is loving and forgiving,  $r = .03$  [-.05, .11],  $p = .43$ , or that karma merely knows people's thoughts and actions,  $r = .06$  [-.02, .14],  $p = .13$ . When giving was simultaneously regressed on belief in karma, belief in karma's reward/punishment of behavior, karma's benevolence, karma's knowledge, experimental condition, and all interactions between beliefs and condition, the sole significant moderator was karma's reward/punishment of behavior,  $b_{int} = 0.063$  [0.010, 0.117],  $p = .020$  (see Supplemental Materials for full models). Therefore, it is specifically belief in karma as a morally-concerned supernatural entity that predicted increased giving when thinking about karma, not mere exposure to the concept (among non-believers), belief in secular justice, or less-moralistic aspects of karma belief.

## GENERAL DISCUSSION

Across four high-powered, pre-registered experiments, we found that both karma and God encouraged adherence to prosocial norms in the dictator game. This effect was moderated by explicit religious belief implying that, beyond simply reminding people of fairness and generosity, supernatural beliefs provide a motivation for believers to adhere to prosocial norms. These results support the role of culturally-structured beliefs about supernatural forces in encouraging cooperation, which could have played an important role in the spread of prosocial religions around the world (Norenzayan et al., 2016; Watts et al., 2015; Johnson, 2015).<sup>6</sup>

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<sup>6</sup> Due to participant payment through quasi-random matching with other participants in Experiments 1 and 2, we were also able to test whether Karma had real effects in our experiments. We found no evidence of karmic payback: participants who were more generous did not receive more money in return ( $bs = -0.17$  to  $0.04$ ,  $ps > .06$ ), although our experiments were in no way designed to answer that particular question (for an alternative perspective of karma's veracity, see Allen, Edwards, & McCullough, 2015).



These studies fill an overlooked gap in the past literature regarding belief in karma. Karma as well as God—two different moralizing supernatural concepts with somewhat distinct cultural histories—can increase prosocial behavior among believers from diverse religious backgrounds, including Christians, Hindus, Buddhists, and the non-affiliated, highlighting the diversity of routes through which supernatural beliefs can enforce normative behavior. We found little support to the idea that thoughts of karma may encourage participants to retain their endowment by rationalizing selfish behavior, at least not in the present paradigm.

We assessed the robustness of the findings by running several alternative data analysis scenarios (Steege, Tuerlinckx, Gelman, & Vanpaemel, 2016). Varying the amount of the endowment did not change the findings, nor did controlling for game familiarity, hypothesis guessing, different data exclusion criteria, and relevant individual difference measures. The effect emerged in within- as well as between-subjects designs with comparable effect sizes, although the latter required a far larger sample size than the former. We found the same pattern of results in samples drawn from two different recruitment methods (Mechanical Turk and Qualtrics Panels). Across all samples, manipulations, and experimental designs we found similar moderately-sized effects of supernatural framing on giving among believers. These experiments also investigated three theoretically-relevant boundary conditions that have not received adequate attention in the previous psychological literature and found that the supernatural framing effect was reduced to essentially zero among participants who had behaved fairly at baseline or who strongly denied belief in karma or God.

### **The moderating role of baseline selfishness**

One consistent moderator of the supernatural framing effect was participants' baseline selfishness vs. fairness, which previous experiments could not investigate due to the exclusive

use of between-subjects designs. We tested this hypothesized interaction in a within-subjects design and found that supernatural framing had diminishing effects as baseline offers approached a fair split. In dictator games, an equal division of the money is the normative prosocial response, while giving away more than half is extremely uncommon in Western populations (Engel, 2011, also see Figure 3). If supernatural concepts encourage prosocial norm adherence, rather than encouraging generosity per se, this implies that supernatural framing should increase giving among initially-selfish participants, and not affect the behavior of those who initially divided the money evenly. We found this pattern found across all three within-subjects experiments where baseline offers could be assessed. Importantly, this does not reflect a methodological ceiling effect in the measure (those who initially gave 50% of the endowment could have also increased their giving after supernatural framing), but instead reflects psychological adherence to normatively-prosocial dictator game behavior. This can help explain one noteworthy high-powered replication failure of religious priming effects (Gomes & McCullough, 2015), in which the average offer in the control condition—at 45%—approached a fair split. Other explanations for differing effects (e.g., the efficacy of explicit vs. implicit primes) are also possible and are being further investigated (e.g., Billingsley et al., 2018; for further discussion see Shariff & Norenzayan, 2015).

In the current samples, supernatural framing did not turn egalitarian fairness into ultrasociality. This pattern is consistent with interpersonal evaluations that view ultra-prosocial behavior no more favourably than fair behavior (Klein & Epley, 2014; Klein et al., 2015), and is also consistent with the hypothesis that moralizing religions curtail selfish tendencies, but that this effect may be crowded out when other mechanisms that encourage prosociality are already in place (Henrich, Ensminger, et al., 2010; Laurin, Shariff, Henrich, & Kay, 2012; Norenzayan et

al., 2016). Future studies could investigate whether supernatural framing causes different shifts in behavior when the normative response is not a fair split, such as giving all of one's endowment away to a recipient who is clearly in need of help, or shifting from fairness to selfishness when interacting with an undeserving or morally suspect recipient.

### **The moderating role of explicit belief**

A second moderator was participants' explicit beliefs about karma and God. Supernatural frames reliably increased prosocial behavior among believers (Experiments 1 – 4), but had weak or inconsistent effects for non-believers (Experiments 3 and 4). This is consistent with meta-analyses of the previous literature that found no reliable effect of religious reminders for nonbelievers (Shariff et al., 2016; Willard et al., 2016) and extends this finding to belief in karma. Thinking about karma had larger effects among believers than non-believers, although a small effect remained among participants who doubted (but did not strongly deny) the existence of karma, perhaps because karma (unlike God) sparked ideas of fairness, reciprocity, or evoked the intuition that prosocial behavior will ultimately be rewarded in future success (documented previously among American children and adults, Banerjee & Bloom, 2017; Converse et al., 2012). Despite a lack of explicit belief in karma as a supernatural force, reminders of karma could have increased giving through acquiescence to these intuitions (Risen, 2016). However, the stronger effect among karma believers demonstrated that our results cannot be fully explained by acquiescence to a shared intuition or simply primed ideas about fairness, which both believers and non-believers associate with karma (White & Norenzayan, 2019). Moreover, belief in a just world, unlike belief in karma, did not moderate the effect of karmic reminders on dictator-game giving. The belief that karma or God is real and willing to intervene in one's life

appears to play an important role in incentivizing normative prosocial behavior in our experiments.

### **The role of supernatural punishment and benevolence**

Several theories have pointed to the important role of supernatural punishment in encouraging prosociality (e.g., Johnson, 2015; Norenzayan et al., 2016; Watts et al., 2015). However, in these experiments we found no evidence that belief in supernatural punitiveness was required for (or enhanced) the effectiveness of supernatural framing. God was described by most participants as extremely benevolent and non-punitive, but thinking about God still decreased selfishness in these samples. Karma's punitiveness also did not moderate the Karma framing effects in Experiments 1 – 3.<sup>7</sup> If anything, our data supports a possible association between giving and belief in supernatural benevolence. There was an overall positive association between ratings of God/karma's benevolence and baseline generosity in Experiments 1 and 3. In Experiment 2, Christians who viewed God as more benevolent or who reported that God rewards generosity showed larger God framing effects, and free listing that karma rewards generosity was associated with greater baseline giving among Buddhists and a larger framing effect among Hindus. Our data therefore provides preliminary (albeit inconsistent) evidence that supernatural framing effects are associated with benevolent and rewarding views of supernatural forces.

Experiment 4 more directly investigated belief that karma is rewarding and punishing by simply asking participants whether karma rewards good behavior and punishes bad behaviour. Here, the belief that karma is rewarding and punishing did indeed predict greater giving and moderated the karma framing effect. This inconsistency with earlier studies suggests divergence between ratings of a supernatural entity's moral concern and ratings of their personality traits. In

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<sup>7</sup> The only case in which belief in supernatural punishment predicted greater giving at conventional levels of significance was among Experiment 1 participants who free listed that Karma would punish greed ( $p = .048$ ) – an effect that we caution against overinterpreting.

general, participants were much more willing to admit that supernatural forces punish immorality than to admit that supernatural forces are mean and vengeful.

There are several other methodological reasons why our results may be inconsistent with previous studies of supernatural punishment. Past research has found supernatural punitiveness to be associated with reduced cheating and criminal behavior (DeBono et al., 2016; Purzycki et al., 2016, 2017; Shariff & Norenzayan, 2011; Shariff & Rhemtulla, 2012), but in the dictator game<sup>8</sup> keeping money for oneself does not obviously involve cheating. DG selfishness merely involves prioritizing one's own self-interest over that of a stranger, and unlike cheating (which is rarely normative), self-benefiting preferences can be justified in many circumstances. Sharing might be perceived as nice, but not obligatory, which perhaps explains why giving is encouraged by the belief in benevolent and rewarding supernatural forces. Our results are more consistent with recent work showing that supernatural benevolence can inspire prosocial behavior like volunteerism (Johnson, Cohen, & Okun, 2016; Johnson, Li, & Cohen, 2015).

Another explanation is that supernatural punitiveness beliefs were restricted in our American samples. Strong evidence supporting the role of supernatural punitiveness comes from research employing diverse cross-cultural samples, including foragers, pastoralists, and agriculturalists with a much wider range of beliefs in supernatural punishment, omniscience, and moral concern (e.g., Lang et al., in press; Purzycki et al., 2016). The present research was conducted with American participants with limited variability in the content of their beliefs. Despite having diverse religious backgrounds, this still represents a thin slice of extant human diversity, and generalizing these results to broader samples is an important direction for future

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<sup>8</sup> Exploratory analyses of free list responses indicated that the belief that God/Karma will reward honesty or punish dishonesty/cheating did not predict dictator game giving or moderate the supernatural framing effect in Experiments 1 or 2.

research (Henrich, Heine, & Norenzayan, 2010; Norenzayan, 2016; Simons, Shoda, & Lindsay, 2017).

Our experiments therefore provide inconclusive evidence of which mechanisms underlie the supernatural framing effect. It is notable that the one factor shared by the supernatural framing effects found in these experiments—found for God and karma; Christians, Hindus, Buddhists, and the non-religious; but not for non-believers—was belief in moralizing supernatural forces who respond to human behavior. We also found that belief in supernatural rewards had small effects in our samples. In the face of potential threats and misfortune in an uncertain world, believers may engage in prosocial behavior not out of the fear of punishment but to increase the likelihood of future good fortune (e.g., Converse et al., 2012), which can still be interpreted as a reward/punishment contingency that incentivizes prosociality. Further research is needed regarding what mechanism supports supernatural framing effects, and whether mechanisms differ between God and karma or between members of different religious groups.

### **Religious identity signaling and demand characteristics**

These results speak against two alternative explanations for our findings. First, supernatural framing may have increased prosociality as a way for participants to signal their religious identity. However, this hypothesis cannot explain why thinking about karma led to similar effects even when karma was not associated with participants' self-expressed religious affiliation: Christian and non-religious participants who claimed to believe in karma responded to supernatural framing as much as Hindu and Buddhist participants. Exploratory analyses further indicated that participants who learned about God or karma from social sources (e.g., religion, family members) or who were more religious, and therefore were more likely to associate God/karma with their social identity, were no more affected by supernatural framing.

Second, the experimenter demand account argues that when participants were asked to think of karma or God, they sought to guess the experimenter's hypothesis, and participants thereby changed their behavior in line with their perception that the experimenters expected generosity. This alternative explanation first predicts that effects depend more on the experimenter rather than on participant characteristics, implying that all participants would be expected to give money away when supernatural framing is present, regardless of their explicit religious belief. However, non-believers were not reliably affected by our manipulation. Additionally, experimenter demand implies that the experimental effect should be reduced to non-significance after controlling for hypothesis guessing, since experimenter demand cannot have an effect unless participants know what the experimenter expects or wants from them. In contrast, the effect of supernatural framing remained robust after controlling for hypothesis guessing. Finally, experimenter demand effects should be stronger in within-subjects designs, where the difference between experimental conditions is more readily apparent to participants, and weaker in between-subjects designs, but the supernatural framing effects were of similar magnitude in both cases (Experiment 3 vs. Experiment 4), implying that experimenter demand was not the driving factor.

### **Limitations, constraints on generalizability, and future directions**

There are several limitations to these experiments. Our samples, despite their religious diversity, were all Americans, limiting our ability to generalize these results to other religious populations of Hindus, Buddhists, and Christians until the proper cross-cultural research is conducted (Henrich et al., 2010; Norenzayan, 2016; Simons et al., 2017). A second limitation of this procedure is that it does not capture many additional important aspects of religion in daily life, such as sacred values (Atran & Ginges, 2012) and extreme rituals (Xygalatas et al., 2013),

which are psychologically potent and may exert powerful influences on behavior. These continue to be important questions, that cannot be addressed using our supernatural framing manipulation.

## **Conclusion**

Our manipulation reflects an ecologically meaningful aspect of thinking and behavior in religious life: Believers are often overtly reminded about the desires of God or about Karmic consequences in everyday religious life, such as in collective prayers in a church, “what would Jesus do” campaigns, repeated prostrations and other Buddhist rituals, extreme rituals in Hindu festivals, and the call to prayer in Muslim communities (e.g., Aveyard, 2014; Rand et al., 2014; “What would Jesus do?,” 2011; Xygalatas, 2013). In many ways, religious traditions explicitly remind adherents about morally-concerned supernatural forces. An important path for future psychological research is to investigate a broader selection of the world’s cultural and religious diversity (Norenzayan, 2016), which reveals a range of ways in which cultural concepts about supernatural forces are intertwined beliefs about social norms, and thereby encourage normative behavior among believers.

## **Open Practices**

Prior to data collection, all materials, hypotheses, and analysis plans were pre-registered on the Open Science Framework (OSF) (Experiment 1:

[https://osf.io/trnx7/?view\\_only=001b24b1b7964f1b80b28c1d66f29dfd](https://osf.io/trnx7/?view_only=001b24b1b7964f1b80b28c1d66f29dfd), Experiment 2:

[https://osf.io/2jyde/?view\\_only=669c0e0415254e6594dddb13fdb9beb1](https://osf.io/2jyde/?view_only=669c0e0415254e6594dddb13fdb9beb1), Experiment 3:

[https://osf.io/69b4n/?view\\_only=94f3fa9dc6b04491bc85cdb305c942fe](https://osf.io/69b4n/?view_only=94f3fa9dc6b04491bc85cdb305c942fe), Experiment 4:

[https://osf.io/m7w9t/?view\\_only=a7bcaa6b55a44cab81ef4385aa827418](https://osf.io/m7w9t/?view_only=a7bcaa6b55a44cab81ef4385aa827418).



All data relevant to analyses described in these studies is available at

[https://osf.io/32x5t/?view\\_only=4456a8f9069f4629bea58eac62174dc9](https://osf.io/32x5t/?view_only=4456a8f9069f4629bea58eac62174dc9).

## References

- Ahmed, A. M. (2009). Are religious people more prosocial? A quasi-experimental study with Madrasah pupils in a rural community in India. *Journal for the Scientific Study of Religion*, 48, 368–374. doi: 10.1111/j.1468-5906.2009.01452.x
- Allen, P. M., Edwards, J. A., & McCullough, W. (2015). Does karma exist?: Buddhism, social cognition, and the evidence for karma. *The International Journal for the Psychology of Religion*, 25(1), 1–17. doi: 10.1080/10508619.2013.879427
- Atran, S., & Ginges, J. (2012). Religious and sacred imperatives in human conflict. *Science*, 336(6083), 855–857. doi: 10.1126/science.1216902
- Aveyard, M. E. (2014). A call to honesty: Extending religious priming of moral behavior to Middle Eastern Muslims. *PLOS ONE*, 9, e99447. doi: 10.1371/journal.pone.0099447
- Banerjee, K., & Bloom, P. (2017). You get what you give: children’s karmic bargaining. *Developmental Science*, 20(5). <https://doi.org/10.1111/desc.12442>
- Benz, M., & Meier, S. (2008). Do people behave in experiments as in the field? Evidence from donations. *Experimental Economics*, 11, 268–281. doi: 10.1007/s10683-007-9192-y
- Bhangaokar, R., & Kapadia, S. (2009). At the interface of ‘Dharma’ and ‘Karma’: Interpreting moral discourse in India. *Psychological Studies*, 54(2), 96–108. doi: 10.1007/s12646-009-0018-1

- Billingsley, J., Gomes, C., & McCullough, M. (2018). Implicit and explicit influences of religious cognition on dictator game transfers. *PsyArXiv*. doi: 10.31234/osf.io/6amfe
- Callan, M. J., Ellard, J. H., & Nicol, J. E. (2006). The belief in a just world and immanent justice reasoning in adults. *Personality and Social Psychology Bulletin*, 32, 1646–1658. doi: 10.1177/0146167206292236
- Charness, G., Gneezy, U., & Halladay, B. (2016). Experimental methods: Pay one or pay all. *Journal of Economic Behavior & Organization*, 131, 141–150. doi: 10.1016/j.jebo.2016.08.010
- Converse, B. A., Risen, J. L., & Carter, T. J. (2012). Investing in karma: When wanting promotes helping. *Psychological Science*, 23, 923–930. doi: 10.1177/0956797612437248
- Cotterill, S., Sidanius, J., Bhardwaj, A., & Kumar, V. (2014). Ideological support for the Indian caste system: Social Dominance Orientation, Right-Wing Authoritarianism and Karma. *Journal of Social and Political Psychology*, 2(1), 98–116. doi: 10.5964/jspp.v2i1.171
- Cronk, L. (2007). The influence of cultural framing on play in the trust game: A Maasai example. *Evolution and Human Behavior*, 28, 352–358. doi: 10.1016/j.evolhumbehav.2007.05.006
- DeBono, A., Shariff, A. F., Poole, S., & Muraven, M. (2016). Forgive us our trespasses: Priming a forgiving (but not a punishing) God increases unethical behavior. *Psychology of Religion and Spirituality*. doi: 10.1037/rel0000105

Engel, C. (2011). Dictator games: A meta study. *Experimental Economics*, 14(4), 583–610. doi: 10.1007/s10683-011-9283-7

Franzen, A., & Pointner, S. (2013). The external validity of giving in the dictator game. *Experimental Economics*, 16, 155–169. doi: 10.1007/s10683-012-9337-5

Fuller, C. J. (2004). *The camphor flame: popular Hinduism and society in India*. Princeton, N.J: Princeton University Press.

Galizzi, M. M., & Navarro-Martinez, D. (2018). On the external validity of social preference games: A systematic lab-field study. *Management Science*. doi: 10.1287/mnsc.2017.2908

Gervais, W. M. (2013). In godlessness we distrust: Using social psychology to solve the puzzle of anti-atheist prejudice. *Social and Personality Psychology Compass*, 7(6), 366–377. doi: 10.1111/spc3.12035

Ginges, J., Sheikh, H., Atran, S., & Argo, N. (2016). Thinking from God’s perspective decreases biased valuation of the life of a nonbeliever. *Proceedings of the National Academy of Sciences*, 113, 316–319. doi: 10.1073/pnas.1512120113

Gomes, C. M., & McCullough, M. E. (2015). The effects of implicit religious primes on dictator game allocations: A preregistered replication experiment. *Journal of Experimental Psychology: General*, 144, e94–e104. doi: 10.1037/xge0000027

Henrich, J., Ensminger, J., McElreath, R., Barr, A., Barrett, C., Bolyanatz, A., ... Ziker, J.

(2010). Markets, religion, community size, and the evolution of fairness and punishment.

*Science*, 327(5972), 1480–1484. doi: 10.1126/science.1182238

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world?

*Behavioral and Brain Sciences*, 33, 61–83. doi: 10.1017/S0140525X0999152X

Johnson, D. (2015). *God is watching you: How the fear of god makes us human*. New York:

Oxford University Press.

Johnson, K. A., Cohen, A. B., & Okun, M. A. (2016). God is watching you...but also watching

over you: The influence of benevolent God representations on secular volunteerism among

Christians. *Psychology of Religion and Spirituality*, 8, 363–374. doi: 10.1037/rel0000040

Johnson, K. A., Li, Y. J., & Cohen, A. B. (2015). Fundamental social motives and the varieties

of religious experience. *Religion, Brain & Behavior*, 5, 197–231. doi:

10.1080/2153599X.2014.918684

Kelly, J. M., Kramer, S. R., & Shariff, A. F. (2019). *Religiosity predicts prosociality (at least*

*when measured with self-reports): A meta-analysis*. Manuscript in Preparation.

Klein, N., & Epley, N. (2014). The topography of generosity: Asymmetric evaluations of

prosocial actions. *Journal of Experimental Psychology: General*, 143, 2366–2379. doi:

10.1037/xge0000025

Klein, N., Grossmann, I., Uskul, A. K., Kraus, A. A., & Epley, N. (2015). It pays to be nice, but not really nice: Asymmetric reputations from prosociality across 7 countries. *Judgment & Decision Making*, 10, 355–364.

Lang, M., Purzycki, B. G., Apicella, C., Atkinson, Q. D., Bolyanatz, A., Cohen, E., ... Henrich, J. (in press). Moralizing gods, extended prosociality, and religious parochialism across 15 societies. *PROC-B*.

Lanman, J. A., & Buhrmester, M. D. (2016). Religious actions speak louder than words: exposure to credibility-enhancing displays predicts theism. *Religion, Brain & Behavior*, 1–14. doi: 10.1080/2153599X.2015.1117011

Laurin, K., Shariff, A. F., Henrich, J., & Kay, A. C. (2012). Outsourcing punishment to God: Beliefs in divine control reduce earthly punishment. *Proc. R. Soc. B*, rspb20120615. doi: 10.1098/rspb.2012.0615

Liberman, V., Samuels, S. M., & Ross, L. (2004). The name of the game: Predictive power of reputations versus situational labels in determining prisoner's dilemma game moves. *Personality and Social Psychology Bulletin*, 30, 1175–1185. doi: 10.1177/0146167204264004

Nelson, L. D., Simmons, J., & Simonsohn, U. (2018). Psychology's Renaissance. *Annual Review of Psychology*, 69(1), 511–534. doi: 10.1146/annurev-psych-122216-011836

Norenzayan, A. (2016). Theodiversity. *Annual Review of Psychology*, 67, 465–488. doi:

10.1146/annurev-psych-122414-033426

Norenzayan, A., Shariff, A. F., Gervais, W. M., Willard, A. K., McNamara, R. A., Slingerland,

E., & Henrich, J. (2016). The cultural evolution of prosocial religions. *Behavioral and Brain Sciences*, 39, e1. doi: 10.1017/S0140525X14001356

Pew Research Center. (2015). The future of world religions: Population growth projections,

2010–2050. *Pew Research Center*. Retrieved from

<http://www.pewforum.org/2015/04/02/religious-projections-2010-2050/>

Peysakhovich, A., Nowak, M. A., & Rand, D. G. (2014). Humans display a ‘cooperative

phenotype’ that is domain general and temporally stable. *Nature Communications*, 5, 4939.

doi: 10.1038/ncomms5939

Pillutla, M. M., & Chen, X.-P. (1999). Social norms and cooperation in social dilemmas: The

effects of context and feedback. *Organizational Behavior and Human Decision Processes*, 78, 81–103. doi: 10.1006/obhd.1999.2825

Purzycki, B. G. (2016). The evolution of gods’ minds in the Tyva Republic. *Current*

*Anthropology*, 57, S88–S104. doi: 10.1086/685729

Purzycki, B. G., Apicella, C., Atkinson, Q. D., Cohen, E., McNamara, R. A., Willard, A. K., ...

Henrich, J. (2016). Moralistic gods, supernatural punishment and the expansion of human sociality. *Nature*, 530, 327–330. doi: 10.1038/nature16980

Purzycki, B. G., Finkel, D. N., Shaver, J., Wales, N., Cohen, A. B., & Sosis, R. (2012). What does God know? Supernatural agents' access to socially strategic and non-strategic information. *Cognitive Science*, 36, 846–869. doi: 10.1111/j.1551-6709.2012.01242.x

Purzycki, B. G., Henrich, J., Apicella, C., Atkinson, Q. D., Baimel, A., Cohen, E., ...

Norenzayan, A. (2017). The evolution of religion and morality: A synthesis of ethnographic and experimental evidence from eight societies. *Religion, Brain & Behavior*, 1–32. doi: 10.1080/2153599X.2016.1267027

Rand, D. G., Dreber, A., Haque, O. S., Kane, R. J., Nowak, M. A., & Coakley, S. (2014).

Religious motivations for cooperation: An experimental investigation using explicit primes. *Religion, Brain & Behavior*, 4, 31–48. doi: 10.1080/2153599X.2013.775664

Risen, J. L. (2016). Believing what we do not believe: Acquiescence to superstitious beliefs and other powerful intuitions. *Psychological Review*, 123(2), 182–207. doi: 10.1037/rev0000017

Shariff, A. F., & Norenzayan, A. (2007). God is watching you: Priming God concepts increases prosocial behavior in an anonymous economic game. *Psychological Science*, 18, 803–809. doi: 10.1111/j.1467-9280.2007.01983.x

Shariff, A. F., & Norenzayan, A. (2011). Mean gods make good people: Different views of God predict cheating behavior. *The International Journal for the Psychology of Religion*, 21, 85–96. doi: 10.1080/10508619.2011.556990



Shariff, A. F., & Norenzayan, A. (2015). A question of reliability or of boundary conditions?

Comment on Gomes and McCullough (2015). *Journal of Experimental Psychology:*

*General*, 144, e105–e106. doi: 10.1037/xge0000111

Shariff, A. F., & Rhemtulla, M. (2012). Divergent effects of beliefs in Heaven and Hell on

national crime rates. *PLoS ONE*, 7, 1–5. doi: 10.1371/journal.pone.0039048

Shariff, A. F., Willard, A. K., Andersen, T., & Norenzayan, A. (2016). Religious priming: A

meta-analysis with a focus on prosociality. *Personality and Social Psychology Review*, 20,

27–48. doi: 10.1177/1088868314568811

Simons, D. J., Shoda, Y., & Lindsay, D. S. (2017). Constraints on generality (COG): A proposed

addition to all empirical papers. *Perspectives on Psychological Science*. doi:

10.1177/1745691617708630

Steege, S., Tuerlinckx, F., Gelman, A., & Vanpaemel, W. (2016). Increasing transparency

through a multiverse analysis. *Perspectives on Psychological Science*, 11(5), 702–712. doi:

10.1177/1745691616658637

Tan, J. H. W. (2006). Religion and social preferences: An experimental study. *Economics*

*Letters*, 90, 60–67. doi: 10.1016/j.econlet.2005.07.006

van Elk, M. van, Matzke, D., Gronau, Q. F., Guan, M., Vandekerckhove, J., & Wagenmakers,

E.-J. (2015). Meta-analyses are no substitute for registered replications: A skeptical

perspective on religious priming. *Frontiers in Psychology*, 6. doi:

10.3389/fpsyg.2015.01365

Watts, J., Greenhill, S. J., Atkinson, Q. D., Currie, T. E., Bulbulia, J., & Gray, R. D. (2015).

Broad supernatural punishment but not moralizing high gods precede the evolution of political complexity in Austronesia. *Proc. R. Soc. B*, 282, 20142556. doi:

10.1098/rspb.2014.2556

What would Jesus do?: The rise of a slogan. (2011, December 8). *BBC News*. Retrieved from

<http://www.bbc.com/news/magazine-16068178>

White, C. J. M., & Norenzayan, A. (2019). *Mental models of supernatural morality*. Manuscript in Preparation.

White, C. J. M., Norenzayan, A., & Schaller, M. (In press). The content and correlates of belief in Karma across cultures. *Personality and Social Psychology Bulletin*. doi:

10.1177/0146167218808502

White, Claire, Sousa, P., & Prochownik, K. (2016). Explaining the success of karmic religions.

*Behavioral and Brain Sciences*, 39, e28. doi: 10.1017/S0140525X15000588

Willard, A. K., Shariff, A. F., & Norenzayan, A. (2016). Religious priming as a research tool for studying religion: Evidentiary value, current issues, and future directions. *Current Opinion in Psychology*, 12, 71–75. doi: 10.1016/j.copsyc.2016.06.003

Xygalatas, D. (2013). Effects of religious setting on cooperative behavior: A case study from

Mauritius. *Religion, Brain & Behavior*, 3, 91–102. doi: 10.1080/2153599X.2012.724547

Xygalatas, D., Mitkidis, P., Fischer, R., Reddish, P., Skewes, J., Geertz, A. W., ... Bulbulia, J.

(2013). Extreme Rituals Promote Prosociality. *Psychological Science*, 24(8), 1602–1605.

doi: 10.1177/0956797612472910

Yilmaz, O., & Bahçekapili, H. G. (2016). Supernatural and secular monitors promote human

cooperation only if they remind of punishment. *Evolution and Human Behavior*, 37, 79–

84. doi: 10.1016/j.evolhumbehav.2015.09.005

Supplementary Materials for  
Supernatural norm enforcement: Thinking about karma and God  
reduces selfishness among believers

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## Experiment 1 Supplementary Results

### PREREGISTERED ANALYSES

#### Possible moderators: Beliefs about God and karma

We examined several alternative mixed-effects models that predicted DG giving from features of the experiment (pre- or post-framing, God or karma condition, endowment in each trial) and individual differences in belief (level of belief in God and karma, view of God/karma as benevolent or punitive). We also investigated whether any of these variables moderated the supernatural framing effect. Features of the experiment were dummy coded: Frame (0 = pre-framing, 1 = post-framing), Condition (0 = God, 1 = Karma), Trial<sub>D1</sub> (0 = \$.30, 1 = \$.40), and Trial<sub>D2</sub> (0 = \$.30, 1 = \$.50). Belief in God, belief in karma, benevolence, punitiveness, familiarity, and hypothesis guessing were standardized prior to analysis.

Bivariate relationships between supernatural belief and giving can be seen in Table S1 and result of these comprehensive regression models can be seen in Table S2. There was a small positive association between DG giving and belief in God, thinking about God, and perceptions of supernatural benevolence. However, the strongest predictor of DG giving in every case, as hypothesized, was the supernatural framing manipulation. Individual differences in supernatural belief did not significantly moderate the strength of the supernatural framing manipulation in these more comprehensive models or if each facet of belief was analyzed separately (Table 3 in the main text). These results confirm the primary experimental findings: participants became more generous when thinking about God or karma than they were initially, and the effectiveness of this framing manipulation did not differ according to the identity of the supernatural concept (God vs. karma) or other individual differences in supernatural belief.

*Table S1. Experiment 1 correlations [95% CI] between beliefs about God and karma and dictator game giving. Excludes participants in the neutral framing condition.*

	Pre-frame giving	Post-frame giving
Belief in God	.12** [.03, .20]	.05 [-.04, .13]
Belief in karma	.03 [-.06, .12]	.12 [-.07, .11]
Benevolence (overall)	.10* [.01, .18]	.10* [.01, .18]
God frame condition	.10 [-.03, .22]	.10 [-.03, .22]
Karma frame condition	.12 [-.005, .24]	.19** [.08, .31]
Punitiveness (overall)	-.03 [-.11, .06]	-.01 [-.10, .07]
God frame condition	.02 [-.10, .14]	.0002 [-.12, .12]
Karma frame condition	-.07 [-.19, .05]	-.05 [-.18, .07]
Thinking about God	.16*** [.07, .24]	.09 [-.002, .17]
Thinking about karma	.08 [-.01, .17]	.07 [-.02, .15]

*Note.* \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

*Table S2. Experiment 1 dictator game giving predicted from features of the experiment, individual differences in participant belief, and hypothesis guessing and familiarity with task.*

	Model S2a: Experimental Conditions			Model S2b: Experimental Conditions and Individual Differences			Model S2c: Experimental Conditions, Individual Differences, and Hypothesis Guessing		
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Intercept	0.187	0.014	<.001	0.161	0.017	<.001	0.158	0.017	<.001
Trial <sub>D1</sub>	0.007	0.006	.19	0.007	0.006	.19	0.007	0.006	.21
Trial <sub>D2</sub>	0.008	0.006	.17	0.008	0.006	.17	0.008	0.006	.18
Pre- vs. Post-Frame	<b>0.081</b>	<b>0.013</b>	<b>&lt;.001</b>	<b>0.056</b>	<b>0.021</b>	<b>.007</b>	<b>0.056</b>	<b>0.021</b>	<b>.008</b>
Condition	-0.008	0.020	.67	0.046	0.028	.10	0.048	0.028	.087
Trial <sub>D1</sub> *Frame	0.012	0.008	.13	0.012	0.008	.13	0.012	0.008	.13
Trial <sub>D2</sub> *Frame	0.004	0.008	.66	0.004	0.008	.66	0.004	0.008	.66
Condition*Frame	0.023	0.018	.21	0.048	0.027	.080	0.047	0.028	.088
Belief in God				<b>0.031</b>	<b>0.011</b>	<b>.005</b>	<b>0.032</b>	<b>0.011</b>	<b>.003</b>
Belief in karma				0.010	0.011	.37	0.015	0.011	.16
Benevolence				<b>0.027</b>	<b>0.012</b>	<b>.03</b>	<b>0.026</b>	<b>0.012</b>	<b>.036</b>
Punitiveness				-0.007	0.010	.49	-0.006	0.010	.55
God*Frame				0.030	0.030	.31	0.034	0.030	.24
Karma*Frame				-0.022	0.012	.074	-0.022	0.013	.083
Benevolence*Frame				0.009	0.020	.64	0.007	0.020	.74
Punitiveness*Frame				-0.003	0.012	.78	-0.003	0.012	.81
God*Frame*Condition				-0.046	0.031	.13	-0.051	0.032	.10
Karma*Frame*Condition				0.035	0.020	.084	0.033	0.021	.10
Benevolence*Frame*Condition				0.009	0.023	.69	0.013	0.024	.60
Punitiveness*Frame*Condition				0.009	0.018	.63	0.007	0.018	.71
Familiarity							0.010	0.010	.31
Hypothesis Guess							<b>0.022</b>	<b>0.010</b>	<b>.026</b>
Familiarity*Frame							-0.004	0.009	.70
Hypothesis Guess*Frame							0.007	0.009	.43
<i>N</i>	504			503			495		
AICc	-3105.09			-3015.48			-2910.36		

*Note.* Bolded estimates are statistically significant at  $p < .05$ .

### Alternative analyses

Rather than mixed-effects models, dictator game giving can also be analyzed through a 2 (Framing) x 2 (Condition: God vs. Karma) mixed ANOVA. This showed a main effect of framing,  $F(1, 502) = 118.85, p < .001, \eta_p^2 = .19$ , but no difference between giving in the God and Karma conditions,  $F(1, 502) = .02, p = .88, \eta_p^2 = .00$ , and no interaction between framing and condition,  $F(1, 502) = 1.59, p = .21, \eta_p^2 = .003$ .

We can also analyze the effect of framing between subjects, rather than within-subjects. Participants reminded of God during the second round of dictator games gave away more money than did participants who received neutrally-framed instructions during the second round,  $d = 0.37, 95\% \text{ CI } [.19, .54], t(483.53) = 4.13, p < .001$ . Karma framing also resulted in greater generosity than did neutral framing,  $d = 0.47, 95\% \text{ CI } [.29, .65], t(497.04) = 5.23, p < .001$ . God framing and Karma framing did not lead to significantly different levels of generosity,  $d = -0.06, 95\% \text{ CI } [.12, .23], t(490.53) = 0.63, p = .53$ .

The God and Karma framing effects can also be directly compared to giving in the neutral condition in a mixed-effects model, in which all three conditions are dummy coded with the neutral condition as the reference group. This indicated that, before supernatural framing, giving did not differ across conditions, but participants were significantly more generous after reminders of God or Karma than in the neutral condition (see Table S3). The change in giving was not significantly different in response to the God frame compared to the Karma frame ( $B = 0.023, SE = 0.016, p = .15$ ).

*Table S3. Mixed-effects model predicting dictator game giving, across all three conditions (God, Karma, and Neutral framing) in Experiment 1.*

	<i>B</i>	<i>SE</i>	<i>p</i>
Intercept	0.193	0.014	<.001
Pre- vs. Post-Frame	-0.006	0.011	.62
Condition <sub>D1</sub> (God vs. Neutral)	-0.000	0.020	.98
Condition <sub>D2</sub> (Karma vs. Neutral)	-0.009	0.020	.66
Frame*Condition <sub>D1</sub>	<b>0.092</b>	<b>0.016</b>	<b>&lt;.001</b>
Frame* Condition <sub>D2</sub>	<b>0.115</b>	<b>0.016</b>	<b>&lt;.001</b>
<i>N</i>	754		
<i>AICc</i>	-4583.911		

*Note.* Bolded estimates are statistically significant at  $p < .05$ .



## EXPLORATORY ANALYSES

### Excluded sample

The primary pattern of results remains unchanged when we included data from everyone who answered the dictator game questions: There remained a significant effect of framing in the God condition,  $d = 0.40$ , 95% CI [0.24, 0.56],  $t(313) = 7.15$ ,  $p < .001$ , and Karma condition,  $d = 0.55$ , 95% CI [0.39, 0.70],  $t(331) = 9.99$ ,  $p < .001$ , but no difference between rounds in the neutral condition,  $d = -0.03$ , 95% CI [-0.17, 0.13],  $t(332) = 0.46$ ,  $p = .65$ .

### Decision-making strategy

Participants responded to an open-ended question about the strategy that they used to make their dictator game decisions. We coded these responses for (1) whether participants mentioned God or karma, (2) if God or karma made them give more, less, or did not affect their giving, and (3) other reasons for their decision. A coding scheme for participants' reasons was developed by the first author by reading 150 participant responses, distributed across conditions. This coding scheme was then used by a research assistant to categorize participants' reasons for sharing money.

In their open-ended descriptions of how they made their dictator game decisions, participants generally (81%) did not mention God or karma. Many participants mentioned sharing/fairness/norms of giving (36.2%, post-frame giving:  $M = 0.44$ ,  $SD = 0.15$ ). Only 8.2% of participants mentioned religious or supernatural motives for sharing, such as God wanting them to share, the obligation of tithing, or wanting future good consequences for themselves (post-frame giving:  $M = 0.40$ ,  $SD = 0.22$ ). Reasons for keeping the money were primarily participants' needing the money for themselves or their families (19.1%, post-frame giving:  $M = 0.09$ ,  $SD = 0.19$ ), just wanting to keep the money for themselves (14.4%, post-frame giving:  $M = 0.07$ ,  $SD = 0.19$ ), or not wanting to share because they do not know the person receiving the money (9.0%, post-frame giving:  $M = 0.07$ ,  $SD = 0.14$ ).

Karma was mentioned by 28% of participants in the Karma framing condition, one participant in the God framing condition and one participant in the Neutral framing condition. God was mentioned by 26% of participants in the God condition, two participants in the Karma framing condition, and no participants in the Neutral framing condition. Of those who mentioned karma, 58% said that karma led them to give more money, 6% said to karma led them to keep the money, and 36% did not say how karma affected their giving. Of those who mentioned God, 57% said that God led them to give more money, 26% said that God led them to keep the money, while 17% did not say how God affected their giving. Mentioning God or karma was associated with greater giving after supernatural framing ( $M = 0.24$  vs.  $0.32$ ,  $t(193) = -3.07$ ,  $p = .002$ ), and those who said that God/karma made them give more money did give away more than those who said God/karma caused them to keep money,  $r = .67$ ,  $p < .001$ , which confirms that participants' explicit consideration of God or karma did encourage them to give away more money.

## Possible moderators

### *Hypothesis Guessing*

Participants responded to an open-ended question about what hypothesis was investigated in this experiment. A research assistant coded how close these responses were to the experimenters' hypotheses. The coding scale range included: -2 = other or incorrect hypothesis, -1 = unsure, 0 = decision making<sup>9</sup>, 1 = generosity/sharing/fairness, 2 or 3 = how religion/God/karma influences behaviour with no prediction of results, 4 = how religion/God/karma makes people give away more money. This provided us with an approximately-continuous measure of closeness to hypotheses which was used to investigate whether participants' perceptions of the purposes of the experiment affected their DG giving. We also investigated participants' familiarity with DG-type tasks as another possible predictor of DG giving.

Hypothesis guessing, examined as a continuous measure of closeness to experimental hypotheses, did predict slightly higher giving after framing,  $r = .15$ , 95% CI [.08, .22],  $p = <.001$ . Additionally, 56% of participants had previously participated in anonymous economic game like the one used in this experiment, but there was no association between familiarity and giving (pre-framing:  $r = .05$ , 95% CI [-.02, .12],  $p = .19$ , post-framing:  $r = .03$ , 95% CI [-.04, .10],  $p = .45$ ). When both familiarity and hypothesis giving were included in the model predicting DG giving (Model 2c, Table S2), supernatural framing remained the strongest predictor of giving, and the supernatural framing effect was not moderated by either familiarity or hypothesis guessing.

### *Social exposure to belief*

We used mixed-effects models to explore whether the supernatural framing effect could have affected participants' responses by reminding them of their religious identity. If this were the case, then the supernatural framing effects may be stronger among participants who associate God/karma with their religious affiliation, who associate God/karma with the prosocial behaviour of other people, or who are more personally committed to their religion. We assessed whether learning about God/karma from these social sources moderated the framing effect. Social sources of learning about God/karma were analyzed aggregated together (Table S4) and split into separate measures of religious influences, family influences, and action influences (Table S5), standardized prior to analysis. None of these variables moderated the effect of reminders of God or karma.

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<sup>9</sup> The MTurk advertisement said that the study was about personal beliefs and decision making.

*Table S4. Social exposure to belief (composite) as a moderator of the God and Karma framing effects in Experiment 1.*

	God Frame Condition			Karma Frame Condition		
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Intercept	0.193	0.014	<.001	0.185	0.014	<.001
Pre- vs. Post-Frame	<b>0.087</b>	<b>0.013</b>	<b>&lt;.001</b>	<b>0.110</b>	<b>0.012</b>	<b>&lt;.001</b>
Social exposure	<b>0.028</b>	<b>0.014</b>	<b>.046</b>	0.027	0.014	.056
Frame*Social exposure	0.004	0.013	.77	0.013	0.012	.28
N	254			249		
AICc	-1504.33			-1596.801		

*Table S5. Social exposure to belief as moderators of the God and Karma framing effects in Experiment 1.*

God Frame Condition												
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Intercept	0.193	0.014	<.001	0.193	0.014	<.001	0.193	0.014	<.001	0.193	0.014	<.001
Pre- vs. Post-Frame	<b>0.087</b>	<b>0.013</b>	<b>&lt;.001</b>	<b>0.087</b>	<b>0.013</b>	<b>&lt;.001</b>	<b>0.087</b>	<b>0.013</b>	<b>&lt;.001</b>	<b>0.087</b>	<b>0.013</b>	<b>&lt;.001</b>
Religion	-0.008	0.014	.58									
Frame*Religion	0.015	0.013	.25									
Family				0.013	0.014	.36						
Frame*Family				0.003	0.013	.83						
Actions							<b>0.043</b>	<b>0.014</b>	<b>.002</b>			
Frame* Actions							-0.000	0.013	.98			
Religiosity										0.001	0.014	.97
Frame*Religiosity										0.013	0.013	.33
AICc	-1501.251			-1500.777			-1509.568			-1500.82		
Karma Frame Condition												
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Intercept	0.186	0.014	<.001	0.185	0.014	<.001	0.185	0.014	<.001	0.184	0.014	<.001
Pre- vs. Post-Frame	<b>0.109</b>	<b>0.012</b>	<b>&lt;.001</b>	<b>0.110</b>	<b>0.012</b>	<b>&lt;.001</b>	<b>0.110</b>	<b>0.012</b>	<b>&lt;.001</b>	<b>0.109</b>	<b>0.012</b>	<b>&lt;.001</b>
Religion	0.008	0.014	.57									
Frame*Religion	-0.001	0.012	.93									
Family				0.025	0.014	.076						
Frame*Family				0.015	0.012	.22						
Actions							0.025	0.014	.078			
Frame* Actions							0.010	0.012	.43			
Religiosity										<b>0.032</b>	<b>0.014</b>	<b>.023</b>
Frame*Religiosity										-0.021	0.012	.091
AICc	-1583.105			-1596.703			-1594.933			-1606.00		

*Salience of Giving in Mental Models of God and Karma*

Participants were given the opportunity to list up to 5 things that God/karma would reward and 5 things that God/karma would punish. We explored whether the supernatural framing effect was stronger among participants who listed greed/generosity in their free lists, using two separate methods of quantifying participants' open-ended responses. "Presence" indicates a variable that was coded as 1 if participants listed greed/generosity one or more times in their free list responses, and 0 if greed/generosity was never listed in any of participants' 5 free list responses. "Salience" indicates a variable for which participants' responses were scaled based on that response's position in the free list. This variable ranges from 0 (never mentioned) to 1 (the first item listed), with intermediate values assigned to values listed later in the free list. Thus, higher scores indicate that the response was more central to participants' mental models of God and karma (see Purzycki & Jamieson-Lane, 2017, for full details). If participants listed more than one item that was coded as generosity/greed, the highest salience score was used for this variable. As can be seen in Table S6, the pattern (size and direction) of effects is similar for both methods of quantifying free list responses. Overall, the strongest predictor of giving in these models is the supernatural framing effect, with free list responses having only a weak and inconsistent influence on giving.

*Table S6. Free list of supernatural punishment for greed and supernatural reward for generosity as moderators of the God framing (top) and Karma framing (bottom) effects in Experiment 1.*

	God Punishes Greed						God Rewards Generosity					
	Presence			Salience			Presence			Salience		
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Intercept	0.198	0.02	<.001	0.194	0.02	<.001	0.191	0.02	<.001	0.186	0.02	<.001
Pre- vs. Post-Frame	<b>0.101</b>	<b>0.01</b>	<b>&lt;.001</b>	<b>0.098</b>	<b>0.01</b>	<b>&lt;.001</b>	<b>0.078</b>	<b>0.02</b>	<b>&lt;.001</b>	<b>0.079</b>	<b>0.02</b>	<b>&lt;.001</b>
Belief	-0.027	0.03	.44	-0.018	0.06	.74	0.005	0.03	.86	0.027	0.04	.47
Frame*Belief	<b>-0.072</b>	<b>0.03</b>	<b>.027</b>	-0.102	0.05	.051	0.025	0.03	.36	0.030	0.04	.40
<i>N</i>	254			254			254			254		
AICc	-1509.84			- 1509.63			- 1503.69			- 1505.32		

	Karma Punishes Greed						Karma Rewards Generosity					
	Presence			Salience			Presence			Salience		
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Intercept	0.184	0.02	<.001	0.184	0.02	<.001	0.163	0.03	<.001	0.172	0.03	<.001
Pre- vs. Post-Frame	<b>0.090</b>	<b>0.02</b>	<b>&lt;.001</b>	<b>0.098</b>	<b>0.02</b>	<b>&lt;.001</b>	<b>0.092</b>	<b>0.03</b>	<b>&lt;.001</b>	<b>0.107</b>	<b>0.02</b>	<b>&lt;.001</b>
Belief	0.002	0.03	.96	0.001	0.04	.98	0.027	0.03	.43	0.018	0.03	.61
Frame*Belief	<b>0.050</b>	<b>0.03</b>	<b>.048</b>	0.044	0.03	.18	0.022	0.03	.46	0.003	0.03	.92
<i>N</i>	250			250			250			250		
AICc	- 1607.69			- 1606.16			- 1605.54			-1604.03		

*Table S7. Descriptive statistics and bivariate correlations between all variables, Experiment 1.*

			God Frame Condition								
	<i>Mean</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. Pre-frame giving	0.19	0.22									
2. Post-frame giving	0.28	0.27	.66***								
3. Belief in karma	2.80	0.80	.08	-.03							
4. Belief in God	8.34	0.97	.10	.14*	-.13*						
5. Benevolence	4.64	0.79	.10	.10	.15*	.18**					
6. Punitiveness	2.44	1.25	.01	-.00	-.08	.04	-.00				
7. Familiarity	2.37	1.52	-.02	-.01	-.12	.04	-.06	-.07			
8. Hypothesis Guessing	1.25	2.22	.10	.13*	-.13*	-.10	.08	-.04	.07		
9. God punishes greed	0.20	0.40	-.04	-.14*	.03	.10	.05	-.01	.07	.11	
10. God rewards generosity	0.36	0.48	.03	.06	-.01	.08	.20**	-.03	.07	.10	.24***

Karma Frame Condition											
	<i>Mean</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. Pre-frame giving	0.18	0.22									
2. Post-frame giving	0.29	0.23	.63***								
3. Belief in karma	3.39	0.60	.01	.07							
4. Belief in God	6.56	2.72	.15*	.06	-.12						
5. Benevolence	3.12	1.21	.12	.20**	.12	-.02					
6. Punitiveness	3.16	1.15	-.07	-.06	.06	.19**	-.12				
7. Familiarity	2.18	1.43	.11	.09	-.08	-.06	-.05	-.14*			
8. Hypothesis Guessing	1.09	2.12	.11	.11	-.03	.00	.03	-.03	.15*		
9. Karma punishes greed	0.38	0.49	-.01	.10	-.01	.01	.14*	-.08	-.01	.09	
10. Karma rewards generosity	0.78	0.41	.04	.09	-.07	.01	.06	.02	-.10	.13*	.28***
Neutral Frame Condition											
	<i>Mean</i>	<i>SD</i>	1	2	3	4	5	6	7		
1. Pre-frame giving	0.19	0.22									
2. Post-frame giving	0.19	0.22	.89***								
3. Belief in karma	2.95	0.81	.08	.11							
4. Belief in God	7.22	2.38	.01	-.01	-.21**						
5. Benevolence	4.14	1.16	-.03	-.09	-.33***	.47***					
6. Punitiveness	2.70	1.19	.04	.04	.13*	-.12	-.24***				
7. Familiarity	2.30	1.48	.07	.05	-.09	-.03	.01	-.04			
8. Hypothesis Guessing	-0.19	1.50	.07	.03	-.03	-.09	-.05	-.07	.07		

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

## Experiment 2 Supplementary Results

### SUPPLEMENTARY FIGURES

Figure S1. Distribution of dictator game giving in Experiment 2, before and after supernatural framing.

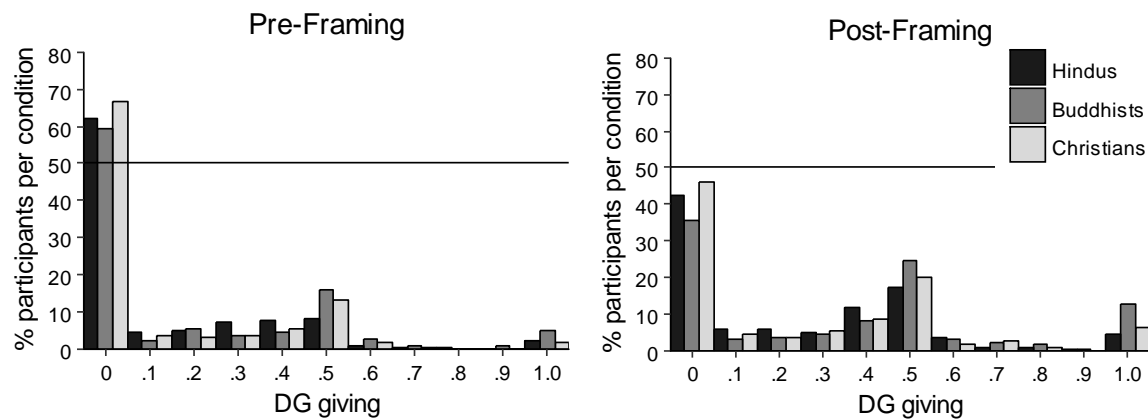
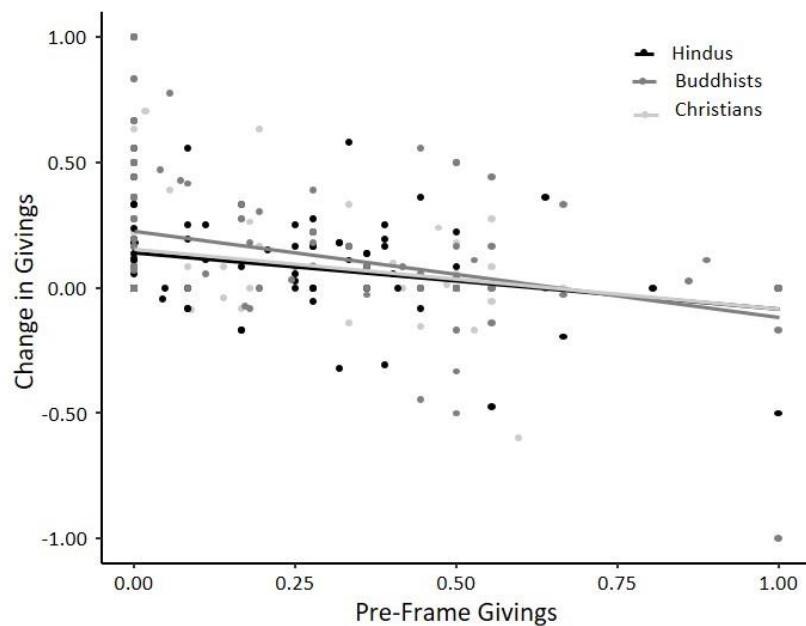


Figure S2. Initial giving predicting change in giving after supernatural framing in Experiment 2. Dots reflect data points for each participant, with lines summarizing this relationship within each condition.





## PREREGISTERED ANALYSES

### Possible moderators: Beliefs about God and karma

We examined several alternative mixed-effects models that predicted DG giving from features of the experiment (pre- or post-framing, trial amount), individual differences in belief (level of belief in God and karma, view of God/karma as benevolent or punitive). Features of the experiment were dummy coded: Frame (0 = pre-framing, 1 = post-framing), Trial<sub>D1</sub> (0 = \$2.00, 1 = \$3.00), and Trial<sub>D2</sub> (0 = \$2.00, 1 = \$4.00). Religious affiliation was dummy coded with Christians as the reference group. Belief in God, belief in karma, benevolence, punitiveness, and familiarity were standardized prior to analysis.

Result of these models can be seen in Table S9, and bivariate relationships between supernatural belief and giving can be seen in Table S8. Overall, there was also a small negative correlation between giving and belief in God, which was mirrored by a negative association between giving and frequency of thinking about God. This can be explained by the generally high generosity and low belief in God among Buddhists in this sample. Consistent with this hypothesis, this negative relationship disappears when participants' religious affiliation was accounted for in the model. There was no association between giving and belief in karma or frequency of thinking about karma. There was no association between giving and views of supernatural benevolence/punitiveness (indexed either through trait attribution or through belief in supernatural rewards and punishments for one's actions). When all individual differences and experimental conditions are accounted for in the model (Model S9b), the largest, and only statistically significant, predictor of DG giving was supernatural framing: participants were more generous after reminders of God or karma than they were on previous trials.

*Table S8. Experiment 2 correlations [95% CI] between beliefs about God and karma and dictator game giving.*

	Pre-frame giving	Post-frame giving
Belief in God	-.07 [-.14, -.01]	-.12** [-.20, -.04]
Belief in karma	.03 [-.05, .11]	.08 [-.003, .16]
Benevolence (overall)	-.04 [-.12, .04]	.01 [-.08, .09]
Hindu (Karma)	.03 [-.11, .16]	-.01 [-.12, .14]
Buddhist (Karma)	.001 [-.14, .14]	.08 [-.06, .21]
Christian (God)	-.17* [-.30, -.03]	.002 [-.13, .14]
Punitiveness (overall)	.01 [-.07, .09]	-.02 [-.10, .06]
Hindu (Karma)	-.03 [-.17, .11]	-.02 [-.15, .12]
Buddhist (Karma)	-.05 [-.19, .08]	-.03 [-.17, .11]
Christian (God)	.11 [-.03, .24]	-.04 [-.18, .10]
Thinking about God	-.07 [-.15, .01]	-.09 [-.17, -.01]*
Thinking about karma	-.003 [-.08, .08]	.05 [-.03, .13]

*Note.* \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

*Table S9. Experiment 2 dictator game giving predicted from features of the experiment, individual differences in participant belief, and hypothesis guessing and familiarity with task.*

	Model S9a: Experimental Conditions			Model S9b: Experimental Conditions and Individual Differences			Model S9c: Experimental Conditions, Individual Differences, and Hypothesis Guessing		
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Intercept	0.147	0.018	<.001	0.155	0.023	<.001	0.153	0.023	<.001
Trial <sub>D1</sub>	-0.003	0.006	.66	-0.003	0.006	.66	-0.003	0.007	.69
Trial <sub>D2</sub>	-0.003	0.006	.64	-0.003	0.006	.64	-0.003	0.007	.69
Pre- vs. Post-Frame	<b>0.122</b>	<b>0.019</b>	<b>&lt;.001</b>	<b>0.098</b>	<b>0.031</b>	<b>.002</b>	<b>0.099</b>	<b>0.031</b>	<b>.011</b>
Hindu	0.005	0.025	.85	-0.005	0.032	.89	0.001	0.032	.97
Buddhist	<b>0.057</b>	<b>0.025</b>	<b>.025</b>	0.043	0.034	.20	0.048	0.034	.16
Trial <sub>D1</sub> *Frame	0.001	0.009	.92	0.001	0.009	.92	0.001	0.009	.94
Trial <sub>D2</sub> *Frame	-0.004	0.009	.66	-0.004	0.009	.66	-0.003	0.009	.76
Hindu*Frame	-0.013	0.026	.61	-0.001	0.038	.99	-0.002	0.038	.81
Buddhist *Frame	0.040	0.026	.12	0.032	0.039	.41	0.032	0.039	.39
Belief in God				-0.005	0.013	.67	-0.003	0.013	.84
Belief in karma				0.003	0.013	.80	0.004	0.013	.73
Benevolence				-0.005	0.012	.65	-0.007	0.012	.54
Punitiveness				0.000	0.011	.99	0.001	0.011	.93
God*Frame				-0.006	0.029	.82	-0.007	0.028	.80
Karma*Frame				0.010	0.021	.61	0.011	0.021	.60
Benevolence*Frame				0.047	0.040	.24	0.046	0.040	.25
Punitiveness*Frame				-0.025	0.020	.21	-0.024	0.020	.22
God*Frame*Hindu				-0.020	0.037	.59	-0.019	0.037	.62
God*Frame* Buddhist				-0.040	0.034	.23	-0.035	0.034	.30
Karma*Frame*Hindu				0.026	0.031	.39	0.026	0.031	.39
Karma*Frame* Buddhist				0.021	0.030	.49	0.025	0.031	.41
Benevolence *Frame* Hindu				-0.051	0.044	.25	-0.053	0.044	.23
Benevolence *Frame* Buddhist				-0.012	0.043	.78	-0.010	0.043	.83
Punitiveness *Frame* Hindu				0.024	0.027	.38	0.024	0.027	.39
Punitiveness *Frame* Buddhist				0.024	0.026	.35	0.021	0.026	.43
Hypothesis Guess							0.018	0.011	.080
Hypothesis Guess *Frame							0.008	0.011	.46
<i>N</i>	607			607			597		
AICc	-2192.16			-2079.52			-2026.59		

*Note.* Bolded estimates are statistically significant at  $p < .05$ .

### Alternative analyses accounting for religious affiliation differences

Dictator game giving can also be analyzed through a 2 (Framing) x 3 (Religious Group: Hindu, Buddhist, Christian) mixed ANOVA. This analysis showed a main effect of framing,  $F(1, 604) = 149.25, p < .001, \eta_p^2 = .20$ , and no interaction between framing and religious group,  $F(2, 604) = 2.27, p = .10, \eta_p^2 = .01$ . The ANOVA also revealed a main effect of religious group, such that Buddhists were more generous overall than were Hindus or Christians,  $F(2, 604) = 6.42, p = .002, \eta_p^2 = .02$ . Exploratory follow-up analyses indicated that it was specifically Buddhist converts who were more generous than other participants. Only 50% of Buddhist participants came from Buddhist families, whereas 92% of Christians and 96% of Hindus came from Christian and Hindu families, respectively, and it was specifically Buddhist converts (pre-framing:  $M = .23$ , 95% CI [.18, .29], post-framing:  $M = .42$ , 95% CI [.36, .49]) who were more generous than Hindus and Christians. Buddhists from Buddhist families (pre-framing:  $M = .17$ , 95% CI [.13, .23], post-framing:  $M = .30$ , 95% CI [.24, .36]) did not significantly differ from Hindus and Christians.

## EXPLORATORY ANALYSES

### Excluded sample

The primary pattern of results remains unchanged when we included data from everyone who answered the dictator game questions: there remained a significant effect of framing for Christians,  $d = 0.57$ , 95% CI [0.41, 0.73],  $t(318) = 10.22, p < .001$ , Hindus,  $d = 0.48$ , 95% CI [0.33, 0.64],  $t(316) = 8.63, p < .001$ , and Buddhists,  $d = 0.56$ , 95% CI [0.38, 0.74],  $t(308) = 8.78, p < .001$ .

### Decision-making strategy

Participants responded to an open-ended question about the strategy that they used to make their dictator game decisions. Using the coding scheme developed in Experiment 1, we coded (1) whether participants mentioned God or karma, (2) if God or karma made them give more, less, or did not affect their giving, and (3) other reasons for their decision.

In their open-ended descriptions of how they made their dictator game decisions, participants generally (90%) did not mention God or karma. Many participants mentioned sharing/fairness/norms of giving (25.9%, post-frame giving:  $M = 0.49, SD = 0.17$ ). Only 7.5% of participants mentioned religious or supernatural motives for sharing, such as God wanting them to share, the obligation of tithing, or wanting future good consequences for themselves (post-frame giving:  $M = 0.45, SD = 0.32$ ). Reasons for keeping the money were primarily participants' thinking that they deserve the money (13.9%, post-frame giving:  $M = 0.06, SD = 0.16$ ), needing the money for themselves (8.3%, post-frame giving:  $M = 0.19, SD = 0.30$ ), or not wanting to share because they do not know the person receiving the money (10.9%, post-frame giving:  $M = 0.08, SD = 0.19$ ).

Karma was mentioned by 8% of Hindus, 8% of Buddhists, and by no Christians. God was mentioned by 14% of Christians, 1% of Hindus, and no Buddhists. Of those who mentioned karma, 52% said that karma led them to give more money, 15% said to karma led them to keep

the money, and 33% did not say that karma affected their giving. In contrast, of those who mentioned God, approximately equal numbers of people said that God led them to give more money (30%) or led them to keep the money (27%), while 43% did not say that God affected their giving. Mentioning God or karma was not associated with greater giving after supernatural framing ( $M = 0.29$  vs.  $0.32$ ,  $t(76) = -.69$ ,  $p = .49$ ). However, those who said that God/karma made them give more money did give away more than those who said God/karma caused them to keep money,  $r = .51$ ,  $p < .001$ .

## Possible moderators

### *Hypothesis Guessing*

Participants responded to an open-ended question about the hypotheses investigated in this experiment, which were coded by a research assistant using the same coding scheme as in Experiment 1. In their open-ended estimates of the purpose of this experiment, only 12% of participants mentioned God, karma, or religiosity. Hypothesis guessing, examined as a continuous measure of closeness to experimental hypotheses, did predict slightly higher giving after framing,  $r = .09$ , 95% CI [.01, .17],  $p = .027$ . However, when hypothesis guessing was included in the model predicting DG giving (Model S9c, Table S9), supernatural framing remained the strongest predictor of giving, and this effect was not moderated by hypothesis guessing. In this sample, 97% of participants had never participated in an economic game task like the one used in the experiment. Therefore, we did not examine whether familiarity with this type of task predicted dictator game giving.

### *Social exposure to belief*

We used mixed-effects models to explore whether the supernatural framing effect could have affected participants' responses by reminding them of their religious identity. We assessed whether learning about God/karma from various social sources moderated the framing effect. Social sources of learning about God/karma were analyzed aggregated together (Table S10) and split into separate measures of religious influences, family influences, and action influences (Table S11) standardized prior to analysis. None of these variables moderated the effect of reminders of God or karma. Participants' personal religiosity also did not moderate the supernatural framing effect.

*Table S10. Social exposure to belief as a moderator of the God and Karma framing effects in Experiment 2.*

	Christians			Hindus			Buddhists		
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Intercept	0.145	0.017	<.001	0.150	0.017	<.001	0.202	0.020	<.001
Pre- vs. Post-Frame	<b>0.121</b>	<b>0.018</b>	<b>&lt;.001</b>	<b>0.107</b>	<b>0.016</b>	<b>&lt;.001</b>	<b>0.160</b>	<b>0.021</b>	<b>&lt;.001</b>
Social exposure	-0.003	0.017	.88	0.016	0.017	.33	-0.006	0.020	.76
Frame*Social exposure	-0.006	0.018	.75	0.021	0.016	.17	-0.003	0.021	.88
<i>N</i>	203			200			204		
AICc	-794.4768			-867.6102			-545.1474		

*Table S11. Social exposure to belief as moderators of the God and Karma framing effects in Experiment 2.*

Christians												
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Intercept	0.144	0.017	<.001	0.145	0.017	<.001	0.145	0.017	<.001	0.145	0.017	<.001
Pre- vs. Post-Frame	<b>0.122</b>	<b>0.018</b>	<b>&lt;.001</b>	<b>0.121</b>	<b>0.018</b>	<b>&lt;.001</b>	<b>0.121</b>	<b>0.018</b>	<b>&lt;.001</b>	<b>0.121</b>	<b>0.018</b>	<b>&lt;.001</b>
Religion	-0.002	0.017	.88									
Frame*Religion	0.006	0.018	.72									
Family				-0.012	0.017	.47						
Frame*Family				0.009	0.018	.59						
Actions							0.006	0.017	.70			
Frame* Actions							-0.021	0.018	.23			
Religiosity										-0.004	0.017	.80
Frame*Religiosity										0.017	0.018	.32
AICc	-804.53			-795.00			-795.77			-795.28		
Hindus												
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Intercept	0.150	0.017	<.001	0.150	0.017	<.001	0.150	0.017	<.001	0.150	0.017	<.001
Pre- vs. Post-Frame	<b>0.107</b>	<b>0.016</b>	<b>&lt;.001</b>	<b>0.107</b>	<b>0.016</b>	<b>&lt;.001</b>	<b>0.107</b>	<b>0.016</b>	<b>&lt;.001</b>	<b>0.107</b>	<b>0.016</b>	<b>&lt;.001</b>
Religion	-0.022	0.017	.19									
Frame*Religion	0.027	0.016	.081									
Family				0.009	0.017	.58						
Frame*Family				0.021	0.016	.18						
Actions							0.029	0.017	.078			
Frame* Actions							0.013	0.016	.39			
Religiosity										0.010	0.017	.55
Frame*Religiosity										0.028	0.016	.075
AICc	- 867.93			-866.63			-868.84			-868.17		

*Table S11 (continued). Social exposure to belief as moderators of the God and Karma framing effects in Experiment 2.*

Buddhists												
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Intercept	0.202	0.020	<.001	0.202	0.020	<.001	0.202	0.020	<.001	0.202	0.020	<.001
Pre- vs. Post-Frame	<b>0.160</b>	<b>0.021</b>	<b>&lt;.001</b>	<b>0.160</b>	<b>0.021</b>	<b>&lt;.001</b>	<b>0.160</b>	<b>0.021</b>	<b>&lt;.001</b>	<b>0.160</b>	<b>0.021</b>	<b>&lt;.001</b>
Religion	-0.035	0.020	.086									
Frame*Religion	0.013	0.021	.54									
Family				0.009	0.020	.67						
Frame*Family				-0.015	0.021	.48						
Actions							-0.009	0.020	.67			
Frame* Actions							0.003	0.021	.87			
Religiosity										0.006	0.020	.78
Frame*Religiosity										0.006	0.021	.79
AICc	-547.94			-545.51			-545.16			-545.20		

***Salience of Giving in Mental Models of God and Karma***

Participants were given the opportunity to list up to 5 things that God/karma would reward and 5 things that God/karma would punish, and these scores were quantified by either the presence/absence of each category or the maximum salience of each category, as in Experiment 1. As can be seen in Table S12, the pattern (size and direction) of effects is generally similar for both methods of quantifying free list responses, with the exception that among Buddhists salience (but not presence) of greed in free list responses predicted greater giving, and the presence (but not salience) of generosity in free list responses predicted greater giving. Together, these results provide some support for an association between belief in supernatural rewards for generosity and greater giving in our experiment, although this effect was not consistent across samples and studies so should be interpreted with caution.

*Table S12. Free list of supernatural punishment for greed and supernatural reward for generosity as moderators of the supernatural framing effects in Experiment 2.*

Christians												
	God Punishes Greed						God Rewards Generosity					
	Presence			Salience			Presence			Salience		
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Intercept	0.142	0.019	<.001	0.144	0.018	<.001	0.144	0.023	<.001	0.141	0.022	<.001
Pre- vs. Post-Frame	<b>0.118</b>	<b>0.020</b>	<b>&lt;.001</b>	<b>0.119</b>	<b>0.019</b>	<b>&lt;.001</b>	<b>0.074</b>	<b>0.024</b>	<b>.003</b>	<b>0.082</b>	<b>0.023</b>	<b>&lt;.001</b>
Belief	0.012	0.040	.76	0.009	0.059	.89	0.002	0.033	.95	0.012	0.041	.76
Frame*Belief	0.010	0.043	.81	0.015	0.063	.81	<b>0.096</b>	<b>0.035</b>	<b>.006</b>	<b>0.106</b>	<b>0.043</b>	<b>.014</b>
<i>N</i>	203			203			203			203		
AICc	- 798.05			-799.53			- 805.07			- 804.74		

Hindus												
	Karma Punishes Greed						Karma Rewards Generosity					
	Presence			Salience			Presence			Salience		
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Intercept	0.133	0.020	<.001	0.132	0.019	<.001	0.148	0.029	<.001	0.161	0.027	<.001
Pre- vs. Post-Frame	<b>0.112</b>	<b>0.019</b>	<b>&lt;.001</b>	<b>0.118</b>	<b>0.018</b>	<b>&lt;.001</b>	<b>0.060</b>	<b>0.027</b>	<b>.026</b>	<b>0.061</b>	<b>0.026</b>	<b>.018</b>
Belief	0.050	0.035	.16	0.085	0.049	.084	0.002	0.035	.95	-0.019	0.038	.61
Frame*Belief	-0.016	0.033	.64	-0.051	0.047	.27	<b>0.071</b>	<b>0.033</b>	<b>.033</b>	<b>0.082</b>	<b>0.036</b>	<b>.024</b>
<i>N</i>	200			200			200			200		
AICc	- 869.00			- 871.85			- 871.90			- 872.45		

Buddhists												
	Karma Punishes Greed						Karma Rewards Generosity					
	Presence			Salience			Presence			Salience		
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Intercept	0.185	0.026	<.001	0.173	0.024	<.001	0.122	0.037	.001	0.155	0.033	<.001
Pre- vs. Post-Frame	<b>0.142</b>	<b>0.027</b>	<b>&lt;.001</b>	<b>0.140</b>	<b>0.026</b>	<b>&lt;.001</b>	<b>0.169</b>	<b>0.040</b>	<b>&lt;.001</b>	<b>0.161</b>	<b>0.035</b>	<b>&lt;.001</b>
Belief	0.045	0.042	.28	<b>0.118</b>	<b>0.055</b>	<b>.033</b>	<b>0.112</b>	<b>0.044</b>	<b>.012</b>	0.084	0.047	.078
Frame*Belief	0.049	0.044	.26	0.082	0.058	.16	-0.012	0.047	.79	-0.001	0.050	.98
<i>N</i>	204			204			204			204		
AICc	- 551.57			-558.77			- 554.89			- 551.87		



*Table S13. Descriptive statistics and bivariate correlations between all variables, Experiment 2.*

			Christians								
	<i>Mean</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. Pre-frame giving	0.15	0.23									
2. Post-frame giving	0.27	0.30	.59***								
3. Belief in karma	2.77	0.71	-.04	.02							
4. Belief in God	4.50	0.97	-.08	-.01	.05						
5. Benevolence	4.76	0.63	-.17*	.00	.10	.60***					
6. Punitiveness	2.24	1.12	.11	-.04	-.06	-.07	-.25***				
7. Familiarity	1.06	0.37	.23**	.10	.02	.06	-.20**	.13			
8. Hypothesis Guessing	-0.11	1.79	.03	.13	-.04	.05	.08	-.07	-.10		
9. God punishes greed	0.22	0.41	.02	.03	-.06	-.01	.01	-.08	-.08	-.05	
10. God rewards generosity	0.49	0.50	.00	.16*	.10	.09	.21**	-.10	-.10	.12	.13

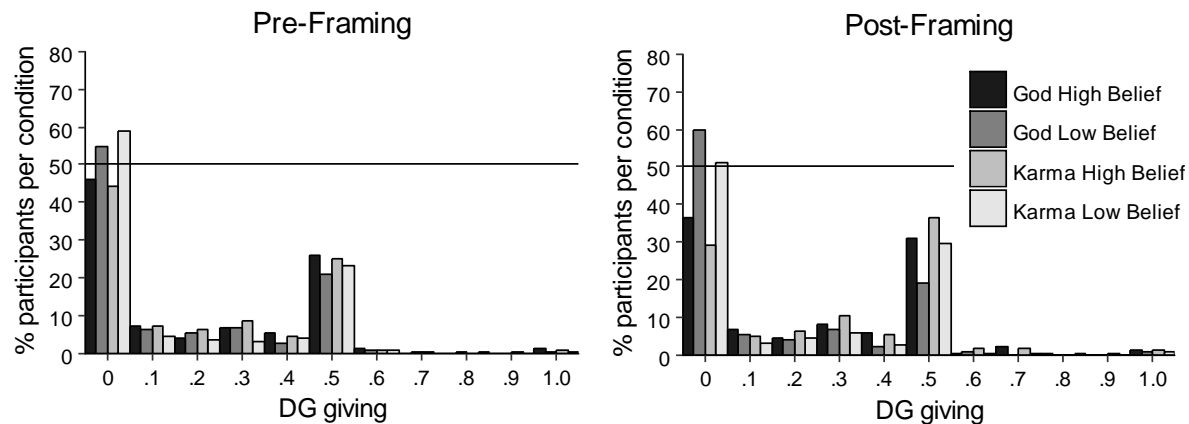
Hindus											
	<i>Mean</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. Pre-frame giving	0.15	0.23									
2. Post-frame giving	0.26	0.28	.65***								
3. Belief in karma	3.73	0.72	-.01	.07							
4. Belief in God	4.29	1.02	-.00	-.04	.44***						
5. Benevolence	3.82	1.13	.02	-.01	.24***	.23**					
6. Punitiveness	2.79	1.15	-.03	-.01	.12	.08	-.11				
7. Familiarity	1.07	0.39	.22**	.06	.04	-.07	-.14	-.02			
8. Hypothesis Guessing	-0.62	1.58	-.06	-.03	-.10	-.09	-.00	-.03	-.01		
9. Karma punishes greed	0.33	0.47	.10	.06	.08	.08	.09	-.13	.13	.18*	
10. Karma rewards generosity	0.66	0.47	.00	.11	.01	-.06	-.03	-.02	-.02	.14	.30***
Buddhists											
	<i>Mean</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. Pre-frame giving	0.20	0.29									
2. Post-frame giving	0.36	0.34	.55***								
3. Belief in karma	3.63	0.67	.06	.10							
4. Belief in God	3.18	1.27	.01	-.08	.25***						
5. Benevolence	3.83	1.16	-.00	.08	.08	.21**					
6. Punitiveness	2.67	1.27	-.06	-.04	.24***	.22**	.14				
7. Familiarity	1.05	0.34	-.02	-.02	.05	-.14	-.06	-.03			
8. Hypothesis Guessing	-0.31	1.77	.20**	.14	-.09	-.14	-.02	-.07	.10		
9. Karma punishes greed	0.38	0.49	.08	.13	-.03	-.04	.06	-.15*	.04	.05	
10. Karma rewards generosity	0.71	0.45	.17*	.14*	.05	.06	.14	.05	-.01	.06	.12

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

### Experiment 3 Supplementary Results

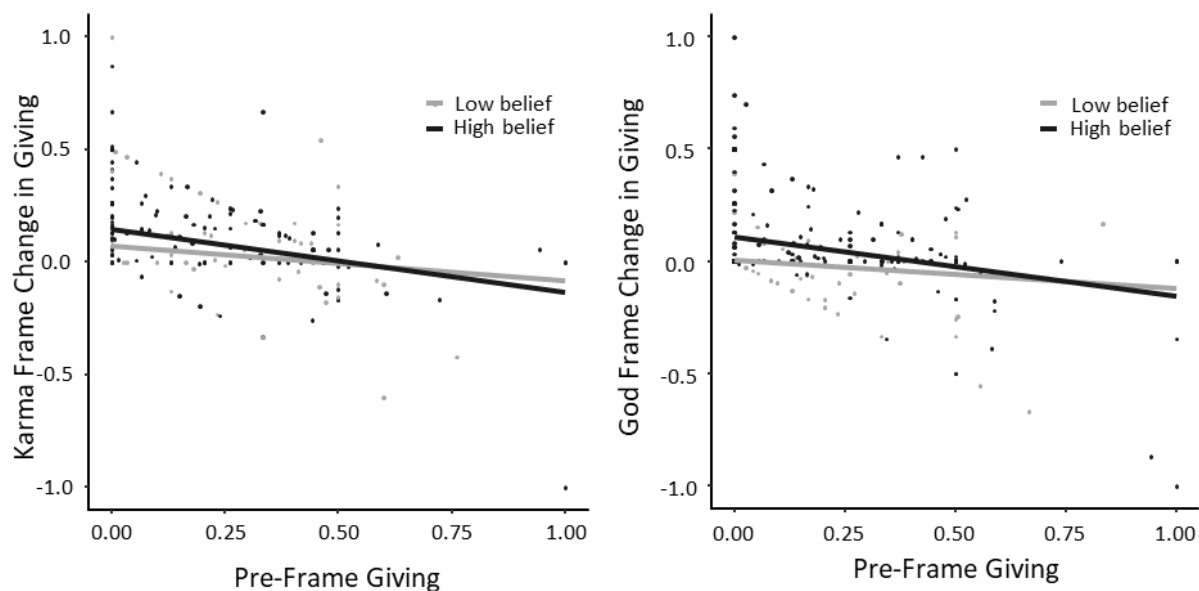
#### SUPPLEMENTARY FIGURES

Figure S3. Distribution of dictator game giving in Experiment 3, before and after supernatural framing.



Note. Participants were split into high and low belief based on a binary measure of belief in God and a median split of belief in karma.

Figure S4. Initial giving predicting change in giving after thinking about Karma (left) and God (right) in Experiment 3. Dots reflect data points for each participant, with lines summarizing this relationship within each condition.



## PREREGISTERED ANALYSES

### Possible moderators: Beliefs about God and karma

We examined how participants' views of God/karma moderated the framing effect. Variables were dummy coded and standardized as in Experiment 1. As can be seen in Table S14 and Table S15 (Model S15b), there was an overall association between views of supernatural benevolence and giving (and no association with punitiveness). Perceptions of supernatural benevolence and punitiveness did not moderate the effect of supernatural framing on giving. There was also an overall association between belief in God and karma and giving, and a significant interaction between participants' level of belief and the supernatural framing effect: Believers increased giving after framing more so than non-believers, an interaction that did not differ between the God and karma framing conditions.

*Table S14. Experiment 3 correlations [95% CI] between beliefs about God and karma and dictator game giving.*

	Pre-frame giving	Post-frame giving
Belief in God	.10 [.04, .16]**	.15 [.08, .21]***
Belief in karma	.09 [.02, .15]**	.16 [.10, .22]***
Benevolence (overall)	.14 [.08, .20]***	.15 [.09, .21]***
God frame condition	.08 [-.005, .17]	.18*** [.09, .26]
Karma frame condition	.22*** [.13, .30]	.23*** [.15, .31]
Punitiveness (overall)	-.06 [-.12, .002]	-.08 [-.14, -.02]*
God frame condition	-.07 [-.16, .02]	-.11* [-.19, -.02]
Karma frame condition	-.04 [-.13, .04]	-.08 [-.16, .01]
Thinking about God	.12 [.06, .18]***	.17 [.11, .23]***
Thinking about karma	.11 [.05, .17]***	.15 [.09, .21]***

*Note.* \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

*Table S15. Experiment 3 dictator game giving predicted from features of the experiment, individual differences in participant belief.*

	Model S15a: Experimental Conditions			Model S15b: Experimental Conditions and Individual Differences		
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Intercept	0.197	0.011	<.001	0.179	0.012	<.001
Trial <sub>D1</sub>	<b>0.009</b>	<b>0.004</b>	<b>.024</b>	<b>0.009</b>	<b>0.004</b>	<b>.024</b>
Trial <sub>D2</sub>	0.006	0.004	.15	0.006	0.004	.15
Pre- vs. Post-Frame	<b>0.023</b>	<b>0.008</b>	<b>.004</b>	<b>0.021</b>	<b>0.009</b>	<b>.028</b>
Condition	-0.006	0.015	.68	0.030	0.017	.091
Trial <sub>D1</sub> *Frame	-0.005	0.005	.37	-0.005	0.005	.37
Trial <sub>D2</sub> *Frame	0.001	0.005	.80	0.001	0.005	.80
Condition* Frame	<b>0.039</b>	<b>0.011</b>	<b>&lt;.001</b>	<b>0.044</b>	<b>0.012</b>	<b>&lt;.001</b>
Belief	<b>0.023</b>	<b>0.008</b>	<b>.002</b>	0.009	0.008	.25
Belief*Frame	<b>0.033</b>	<b>0.007</b>	<b>&lt;.001</b>	<b>0.030</b>	<b>0.009</b>	<b>&lt;.001</b>
Belief*Frame* Condition	-0.013	0.010	.720	-0.009	0.011	.40
Benevolence				<b>0.035</b>	<b>0.010</b>	<b>&lt;.001</b>
Punitiveness				-0.004	0.008	.57
Benevolence* Frame				0.005	0.010	.60
Punitiveness* Frame				-0.001	0.007	.90
Benevolence* Frame*Condition				-0.004	0.013	.78
Punitiveness* Frame*Condition				-0.006	0.011	.57
N	986			986		
AICc	-6942.12			- 6912.45		

*Note.* Bolded estimates are significant at  $p < .05$ .

### Alternative analyses

In an alternative analysis, we split participants into those high and low in belief and conducted a 2 (framing) x 2 (Condition: God vs. Karma) x 2 (Belief: low belief vs. high belief) mixed ANOVA. This also reveals the interaction between belief and supernatural framing, depicted in Figure 6. There was a main effect of framing,  $F(1, 982) = 53.02, p < .001, \eta_p^2 = .05$ , and a main effect of belief,  $F(1, 982) = 25.38, p < .001, \eta_p^2 = .03$ , that was qualified by a significant interaction between framing and condition,  $F(1, 982) = 17.91, p < .001, \eta_p^2 = .02$ , and between framing and belief,  $F(1, 982) = 25.46, p < .001, \eta_p^2 = .03$ . There was no main effect of condition,  $F(1, 982) = 1.96, p = .16, \eta_p^2 = .002$ , no interaction between condition and belief,  $F(1, 982) = 0.20, p = .65, \eta_p^2 = .00$ , and no interaction between framing, condition, and belief,  $F(1, 982) = 1.18, p = 0.28, \eta_p^2 = .001$ .

### EXPLORATORY ANALYSES

#### Excluded sample

The primary pattern of results remains unchanged when we included data from everyone who answered the dictator game questions. When reminded of God, those who believe in God became more generous,  $d = 0.25$ , 95% CI [0.10, 0.42],  $t(300) = 4.48, p < .001$ , while non-believers became slightly less generous,  $d = -0.15$ , 95% CI [-0.34, 0.05],  $t(206) = -2.10, p = .037$ . In contrast, when reminded of karma all participants became more generous, although this increase in giving was greater for those who believe in karma,  $d = 0.45$ , 95% CI [0.27, 0.63],  $t(243) = 7.09, p < .001$ , than for non-believers,  $d = 0.26$ , 95% CI [0.09, 0.43],  $t(261) = 4.21, p < .001$ .

The primary pattern of results also remains unchanged when we exclude participants who completed the study in less than 5 minutes (as was initially proposed, in addition to other exclusion criteria). When reminded of God, those who believe in God became more generous,  $d = 0.31$ , 95% CI [0.13, .049],  $t(239) = 4.77, p < .001$ , while non-believers became slightly less generous,  $d = -0.18$ , 95% CI [-0.41, 0.05],  $t(145) = 2.22, p = .028$ . In contrast, when reminded of karma all participants became more generous, although this increase in giving was greater for those who believe in karma,  $d = 0.49$ , 95% CI [0.28, 0.71],  $t(171) = 6.44, p < .001$ , than for non-believers,  $d = 0.27$ , 95% CI [0.05, 0.48],  $t(173) = 3.52, p < .001$ .

#### Decision-making strategy

We asked participants in the God frame condition whether thinking about God affected how much they gave. 76.7% of participants responded that thinking about God did not affect how much they gave (40.1% responded that they believe in God, but thinking about God did not affect their response; 36.6 % responded that they did not believe in God and thinking about God did not affect their response). Consistent with their responses, those who said that thinking about God did not affect their decision-making did not significantly change their giving in response to the frame: Believers  $d = -0.03$ , 95% CI [-0.23, 0.16],  $t(199) = -0.48, p = .63$ , Nonbelievers  $d = -0.12$ , 95% CI [-0.33, 0.08],  $t(181) = 1.68, p = .096$ .

The remaining 23.3% of participants said that thinking about God did affect their donations (17.4% said they believe in God and it affected their response; 5.6% said they did not believe in God but it affected how they responded). Believers who said they were affected by the God frame significantly increased their donations in response to the frame,  $d = 0.69$ , 95% CI [0.38, 1.00],  $t(85) = 6.43$ ,  $p < .001$ . Nonbelievers who said they were affected gave less, although this change was not statistically significant,  $d = -0.15$ , 95% CI [-0.67, 0.37],  $t(29) = 0.83$ ,  $p = .41$ .

Additionally, we analyzed the direction of change in giving (i.e. increase vs. decrease) as a function of belief. Among believers, 27.2% gave more than they originally did after being asked to think about God, while only 7.1% gave less (the remaining 65.7% gave exactly the same amount). Among non-believers, 8.7% gave more after being told to think about God, while 14.6% gave less (the remaining 76.7% gave exactly the same amount). In general, reminding believers about God tended to increase giving, but reminding non-believers about God tended to decrease giving or fail to change it at all.

In contrast to participants reminded of God, a smaller percentage of participants (64.0%) reported being unaffected by thinking about karma (29.7% reported believing but not being affected; 34.3% reported not believing and not being affected). Consistent with their responses to this question, giving did not change across trials among believers,  $d = 0.08$ , 95% CI [-0.15, 0.31],  $t(144) = 0.98$ ,  $p = .33$ , or non-believers,  $d = -0.07$ , 95% CI [-0.28, 0.15],  $t(166) = 0.88$ ,  $p = .38$ , who reported being unaffected by reminders of karma.

The remaining 36.0% of participants reported being affected by the frame (26.7% said they believed and were affected; 9.3% said they did not believe and were affected). Giving significantly increased among both believers,  $d = 0.84$ , 95% CI [0.58, 1.09],  $t(131) = 9.54$ ,  $p < .001$ , and non-believers,  $d = 0.81$ , 95% CI [0.38, 1.24],  $t(45) = 5.49$ ,  $p < .001$ , who said that they were affected by reminders of karma.

We again analyzed the direction of change in giving as a function of belief. Among those high in belief in karma, 6.7% decreased their giving when thinking about karma, while 41.3% increased their giving (the remaining 52.0% did not change their pattern of giving). Among those low in belief in karma, only 7.5% decreased their donation amount when thinking about karma, while 19.1% increased their donations (the remaining 73.4% did not change their pattern of giving). Therefore, thinking about karma and God seem to have similar effects on generosity among believers, but divergent effects on the generosity of non-believers, with karma increasing and God slightly decreasing non-believers' giving.

### **Possible moderators: Hypothesis guessing**

Participants completed an open-ended question regarding the purpose of the study. These responses were coded using the same coding scheme used in Experiments 1 and 2. Here, hypothesis guessing did not predict post-frame giving,  $r = -.05$ , 95% CI [-.11, .01],  $p = .11$ . This was true both for those in the God condition ( $r = -.07$ , 95% CI [-.16, .02],  $p = .12$ ) and those in the karma condition ( $r = -.02$ , 95% CI [-.11, .07],  $p = .63$ ). Therefore, consistent with results from Experiments 1 and 2, participants' perception of the hypotheses of the experiment cannot explain the supernatural framing effect described above.

*Table S16. Descriptive statistics and bivariate correlations between all variables, Experiment 3.*

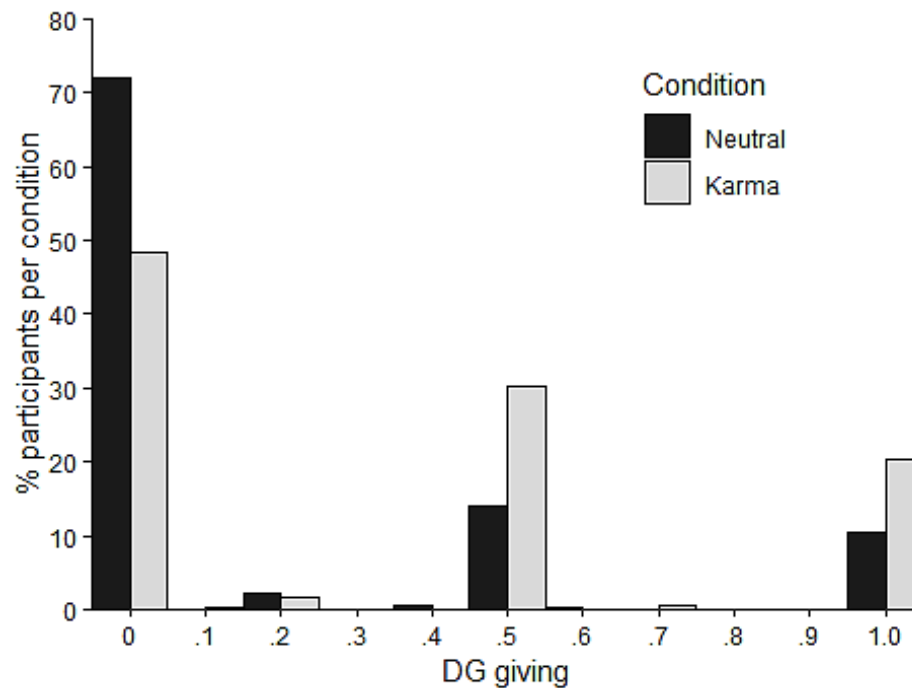
God Frame Condition							
	<i>Mean</i>	<i>SD</i>	1	2	3	4	5
1. Pre-frame giving	0.20	0.24					
2. Post-frame giving	0.22	0.25	.77***				
3. Belief in karma	2.55	0.89	.08	.15***			
4. Belief in God	5.54	3.30	.11*	.23***	.45***		
5. Benevolence	4.20	1.07	.08	.18***	.24***	.53***	
6. Punitiveness	2.75	1.21	-.07	-.11*	-.22***	-.26***	-.26***
Karma Frame Condition							
	<i>Mean</i>	<i>SD</i>	1	2	3	4	5
1. Pre-frame giving	0.20	0.23					
2. Post-frame giving	0.26	0.25	.75***				
3. Belief in karma	2.59	0.87	.09	.17***			
4. Belief in God	5.56	3.17	.10*	.05	.38***		
5. Benevolence	2.96	1.16	.22***	.23***	.31***	.06	
6. Punitiveness	3.15	1.09	-.04	-.08	-.04	.11*	-.26***

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$



### Experiment 4 Supplementary Results

Figure S5. Distribution of dictator game giving in Experiment 4.



## EXPLORATORY ANALYSES

### Excluded sample

The primary pattern of results remains unchanged when we included data from everyone who answered the dictator game questions: Participants asked to think about karma gave away more money than did participants not reminded of karma,  $d = 0.40$ , 95% CI [0.31, 0.50],  $t(1747.8) = 8.53$ ,  $p < .001$ , but this experimental effect interacted with participants' level of belief in karma, with a greater difference between the karma framing and control condition when participants were higher in belief in karma,  $b = 0.044$ , 95% [0.011, 0.076],  $p = .008$ .

## **Possible moderators**

### ***Hypothesis Guessing***

Participants responded to an open-ended question about the hypotheses investigated in this experiment, which were coded by a research assistant using the same coding scheme as in Experiment 1. Hypothesis guessing, examined as a continuous measure of closeness to experimental hypotheses, was unassociated with giving in the karma framing condition,  $r = .02$ , 95% CI [-.06, .10],  $p = .62$ , and the control condition,  $r = .004$ , [-.08, .08],  $p = .93$ , and when hypothesis guessing was included in the model predicting DG giving (Model S17c, Table S17), hypothesis guessing did not moderate the supernatural framing effect. In this sample, 94% of participants had never participated in an economic game task like the one used in the experiment. Therefore, we did not examine whether familiarity with this type of task predicted dictator game giving.

### ***Beliefs about karma***

We explored whether holding specific views of karma as morally-concerned predicting giving. Among participants in the karma framing condition (but not in the control condition), giving was significantly correlated with stronger belief that karma rewards good behaviour or punishes bad behaviour (Table S18). Giving was not significantly associated with other aspects of karma that are less directly moralistic, such as the view that karma is loving and forgiving or that karma merely knows people's thoughts and actions. Similarly, when giving was predicted from belief in karma, belief in karma's reward/punishment of behaviour, karma's benevolence, karma's knowledge, experimental condition, and all interactions between beliefs and condition, it was belief in karma's reward/punishment of behaviour that was the strongest (and only statistically significant) moderator of the karma framing effect (Table S17, Model S17b).

*Table S17. Experiment 4 dictator game giving predicted from features of the experiment, individual differences in participant belief, and hypothesis guessing.*

	Model S17a: Experimental Conditions			Model S17b: Experimental Conditions and Individual Differences			Model S17c: Experimental Conditions, Individual Differences, and Hypothesis Guessing		
	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>B</i>	<i>SE</i>	<i>p</i>
Intercept	<b>0.183</b>	<b>0.015</b>	<b>&lt;0.001</b>	<b>0.182</b>	<b>0.015</b>	<b>&lt;0.001</b>	<b>0.183</b>	<b>0.016</b>	<b>&lt;0.001</b>
Karma vs. Control Condition	0.174	0.020	<b>&lt;0.001</b>	<b>0.173</b>	<b>0.020</b>	<b>&lt;0.001</b>	<b>0.173</b>	<b>0.022</b>	<b>&lt;0.001</b>
Belief in Karma	-0.023	0.014	0.12	-0.025	0.017	0.16	-0.025	0.017	0.16
Condition*Karma	<b>0.053</b>	<b>0.020</b>	<b>0.010</b>	0.043	0.025	0.088	0.043	0.025	0.086
Karma Rewards/Punishes				-0.021	0.020	0.29	-0.022	0.020	0.28
Karma's Benevolence				0.015	0.019	0.45	0.015	0.019	0.44
Karma's Knowledge				0.012	0.023	0.62	0.012	0.023	0.62
Condition *Rewards/Punishments				<b>0.063</b>	<b>0.027</b>	<b>0.020</b>	<b>0.063</b>	<b>0.027</b>	<b>0.023</b>
Condition *Benevolence				-0.028	0.027	0.29	-0.028	0.027	0.30
Condition *Knowledge				-0.013	0.031	0.67	-0.012	0.031	0.69
Hypothesis Guess							0.001	0.011	0.90
Condition *Hypothesis Guess							0.004	0.015	0.80
<i>N</i>	1244			1241			1241		
AICc	994.53			993.62			997.31		

*Table S18. Descriptive statistics and bivariate correlations between all variables, Experiment 4.*

	Karma Condition								
	<i>Mean</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Giving	0.36	0.39							
2. Belief in karma	2.90	0.79	0.08						
3. Belief in a just world	3.31	0.72	0.03	0.36***					
4. Punishment	2.97	1.37	0.09*	0.43***	0.17***				
5. Rewards	2.97	1.37	0.12**	0.43***	0.26***	0.73***			
6. Benevolence	2.19	1.13	0.03	0.46***	0.23***	0.36***	0.47***		
7. Knowledge	2.46	1.25	0.06	0.52***	0.20***	0.53***	0.55***	0.61***	
8. Hypothesis guessing	-0.15	1.54	0.02	-0.08*	0.06	-0.00	0.01	-0.09*	-0.10**
	Control Condition								
	<i>Mean</i>	<i>SD</i>	1	2	3	4	5	6	7
1. Giving	0.18	0.33							
2. Belief in karma	2.85	0.81	-0.07						
3. Belief in a just world	3.32	0.67	0.02	0.27***					
4. Punishment	2.92	1.41	-0.06	0.48***	0.16***				
5. Rewards	2.82	1.42	-0.04	0.46***	0.22***	0.71***			
6. Benevolence	2.14	1.14	0.00	0.44***	0.20***	0.38***	0.53***		
7. Knowledge	2.35	1.22	-0.02	0.50***	0.16***	0.59***	0.65***	0.66***	
8. Hypothesis guessing	-0.64	1.29	0.00	-0.01	-0.00	0.10*	0.05	-0.05	0.00

*Note.* \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .