Thoughts and Prayers -- Do They Crowd out Charity Donations?*

Linda Thunström[a]

Abstract

For centuries, scholars have examined what motivates prosocial behavior. In the U.S., prosocial behavior is routinely accompanied by thoughts and prayers. Yet, the impact on prosocial behavior of such gestures is unknown. We examine how thoughts and prayers affect charity donations to victims of a major public risk -- natural disasters. Our analytical framework suggests both thoughts and prayers increase empathy for those receiving such gestures, which may positively impact donations. However, we also find that prayers on behalf of others are regarded as helpful to recipients – we identify them as a moral action -- which can generate a counter-veiling substitution effect on donations. On net, our framework suggests prayers crowd out donations to natural disaster victims, while thoughts do not. We test these predictions in three incentivized experiments with Red Cross donations to hurricane victims. Consistent with our model, our main experiment finds prayers reduce donations, while thoughts do not. Two follow-up experiments find results are robust to alternative hurricane locations but may be sensitive to other frames -- we find no impact of thoughts or prayers on donations when donations are capped at small amounts. Nevertheless, our results provide the novel insight that prayers may have important effects on material aid in the wake of public catastrophes (in two out of three experiments they crowd out donations), which highlights the importance of research on the impact of prayers on prosocial behavior.

Keywords: thoughts; prayers; natural disasters; prosocial behavior; charity donations; moral actions

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[a]Department of Economics, University of Wyoming, 1000 E. University Ave. Laramie, WY 82071. Fax: +1-307-766-5090, phone: +1-307-760-3881, e-mail: lthunstr@uwyo.edu.

1. Introduction

What motivates prosocial behavior? For centuries, this question has been important to scholars in a range of disciplines (Sachdeva et al., 2009). Numerous meta-analyses, containing decades of research, demonstrate the persistent efforts devoted to identify factors that affect prosocial actions (e.g., Underwood and Moore, 1982; Steblay, 1987; Carlson et al., 1988; Shariff et al., 2016). In the U.S., prosocial behavior is routinely accompanied by intercessory thoughts and prayers (thoughts and prayers conducted on behalf of others).Thoughts and prayers are often a "first response" to major public risks, such as hurricanes, wild fires, mass shootings or terrorist attacks. These gestures are conducted in both private and public spaces, by citizens and policy makers alike. For instance, in response to the devastating impact of hurricane Harvey (a category 4 storm that made landfall in Texas August 25, 2017), President Trump declared a National Day of Prayer. In response to the same catastrophe, former President Clinton tweeted: "Our thoughts and prayers continue to be with all of the people affected by Hurricane Harvey and with those helping them." (August 30, 2017). After a mass shooting in Las Vegas on October 1, 2017, Senator Catherine Cortez Masto (D-Nev) said in a statement that "All of those affected are in our thoughts and prayers," while after a mass shooting at a school in Parkland, Florida, Florida Governor Rick Scott tweeted: "My thoughts and prayers are with the students, their families and the entire community." (February 14, 2018).

Despite the common usage of intercessory thoughts and prayers as a means to express sympathy with those directly affected by major public risks, their impact on accompanying prosocial behavior is unknown. In this knowledge vacuum, people have formed strong, and diverse, preconceived notions of what might be the impact of thoughts and prayers on prosocial behavior and policy reform aimed at public risk reduction, as shown by a heated public debate in the U.S. Critics perceive intercessory thoughts and prayers as excuses not to take action. This implies not only that the gestures themselves are unhelpful, but also that they may be substitutes for other helpful actions (e.g., financial aid or policy reforms). For instance, former President Obama repeatedly stated that "thoughts and prayers are not enough" when addressing mass shootings during his presidency, implying that policy action is needed to reduce the risk of such catastrophes. This sentiment was echoed by the substantial backlash amongst Twitter users against people sending "thoughts and prayers" after the mass shooting in LasVegas (hashtag

#ThoughtsandPrayers). For instance, Senator Chris Murphy tweeted on October 2, 2017, "…your cowardice to act cannot be whitewashed by thoughts and prayers." In response to such criticism, Vice President Pence said on Fox News November 7, 2017, that praying takes nothing away from efforts to understand what causes mass shootings.

This study is the first to explore the impact of thoughts and prayers on prosocial behavior. We focus our study on the effects of thoughts and prayers on material help (charity donations) in the aftermath of a natural disaster. For practical purposes, we limit our study to examine the effect on donations from religious Christians and non-religious (atheists and agnostics). Christianity is the majority religion in the U.S., with around 65 percent of Americans identifying as Christians, while atheists and agnostics make up around 10 percent of the population (Pew Research Center, 2019).

We develop an analytical framework for the impact of intercessory thoughts and prayers on charity donations to victims of natural disasters. Multiple sources inform our framework (Christian religious scripture, insights from consumer research, and a complementary survey conducted on Amazon Mechanical Turk). We find that intercessory thoughts and prayers increase *empathy* and saliency of the well-being of natural catastrophe victims, which has a positive effect on donations. Unlike thoughts, intercessory prayers are regarded by senders as directly helpful to recipients (i.e., we identify them as a "moral action"), such that they may be a *substitute* for monetary donations and thereby reduce donations. The act of praying crowds out charity donations if the negative substitution effect dominates the positive empathy effect. Our analytical framework predicts that intercessory prayers crowd out donations in the wake of major, highly salient, public catastrophes, while thoughts do not.

We empirically test the impact of thoughts and prayers on donations in economic experiments with actual monetary donations to natural disaster victims, made via the Red Cross. Participants of our main experiment are recruited from Qualtrics' market research panel. Consistent with the predictions from our analytical framework, our main experimental study suggests that conducting an intercessory prayer crowds out donations, while donations are unaffected by taking a moment to think of the hurricane victims. Given experimental results are often sensitive to framing, we designed two follow-up experiments to examine the validity of our findings across frames (location of the hurricane and the donation elicitation mechanism). The

results from Follow-up experiment 1 suggest the main findings are robust across the location of the hurricane in continental USA. In Follow-up experiment 2, maximum possible donations are ten times smaller than in the other two experiments and the donation decision is cognitively less demanding. Here, we do not detect an impact of intercessory thoughts and prayers on donations. The crowding out effect of prayers may therefore be sensitive to the stakes at hand. This is consistent with prior research that shows the complementarity between a costless moral action and a subsequent moral action is higher when the cost of the second task is small (Scott, 1977).

Our results offer first insights into the effect of intercessory thoughts and prayers on prosocial behavior. Our findings underline the importance of examining how these gestures (while undertaken by individuals, policy makers or the nation as a collective, e.g., National prayer days) might impact accompanying material aid and investments in public risk reduction, given we find (albeit not robustly) that they may have undesired effects. Further, our survey responses imply that an intercessory prayer is regarded as a moral action, suggesting we may have identified one of the (possibly *the*) most frequently used moral action to accompany material help offered by Americans to those in need.[1] Identifying intercessory prayers as moral actions is significant, given several influential consumer behavior theories, dating back more than half a century (e.g., Heider, 1946; Festinger, 1957; Freedman, and Fraser, 1966; Monin and Miller, 2001), suggest moral actions are related. If prayers are moral actions, these theories suggest that we *should expect* the act of praying to correlate with subsequent prosocial behavior, even though they may disagree on the direction of the correlation.

Our finding that prayers are perceived as directly helpful in the wake of disasters relates to recent research showing that religiosity (the extent to which a person engages in religious behavior) increases in the wake of natural catastrophes (Zapata, 2018; Sinding Bentzen, 2019). Sinding Bentzen (2019) finds that the increase in religiosity is manifested primarily by people turning to prayers and seeking closeness to God. Ager and Ciccone (2017) find religious participation increases when the risk of destructive rainfall increases, and Auriol et al. (2017) find that church donations may be used as insurance, mainly due to the expectation of divine intervention in the event of catastrophes. These studies, in conjunction with our finding that

[1] Although it is unknown how much of praying is conducted on behalf of others, the act of praying is common – the Pew Research Center (2014) finds a majority of Americans pray on a daily basis.

prayers are perceived as helpful, suggest religiosity, including prayers, may be important parts of private agents' risk reduction strategies. They may apply both to private and public risk. Viscusi et al. (1988) find that altruistic agents value public risk reductions, and Jones-Lee (1991) shows that safety concerns for others increases the value of public safety. Further, Thunström and Noy (2019) find religious Christians value receiving others prayers in times of hardship (e.g., after a natural disaster), as suggested by a positive willingness-to-pay (WTP) for prayers. Religious Christians also value receiving thoughts, if provided by fellow religious Christians. Atheists and agnostics, however, are averse to both thoughts and prayers from religious Christians, while indifferent to thoughts from non-religious. Our overall results, however, suggest that using prayers as risk reduction strategies might come at the expense of lower material aid.

More broadly, our study relates to the literature on prosocial behavior and religion or religiosity. Shariff et al. (2016) find that prosocial behavior increases when people are subjected to religious primes (e.g., participants are flashed with religious words), and Benjamin et al. (2016) find religious primes impacts public goods contributions. Studies relying on self-reported data typically find that religiosity is positively associated with prosocial behavior (e.g., Monsma, 2007), while studies based on observed prosocial behavior are inconclusive about the relationship between religiosity and general prosocial behavior (e.g., Darley and Batson, 1973; Batson et al., 1989; Batson et al., 1993; Saroglou et al., 2005; Norenzayan and Shariff, 2008). Studies generally find that religiosity is positively associated with volunteer work in the community (Wilson and Musick, 1997; Youniss et al., 1999; Ozorak, 2003). Religion has also been found to be an important determinant of economic behavior and preferences, see e.g., Iannaccone (1998), Bénabou and Tirole (2003), McCleary and Barro (2006), Noussair et al. (2013), Campante and Yanagizawa-Drott (2015), Minton and Kahle (2016), Noy and O'Brien (2016) and Karlan et al. (2017).

2. Analytical framework

We focus our analytical framework on the impact of thoughts and prayers from religious Christians and non-religious (atheists and agnostics). The building blocks of our model are informed by multiple sources -- consumer research, Christian religious scripture and a supplemental survey. For the survey, we aimed to recruit 450 U.S. participants on Amazon

Mechanical Turk. To increase the quality of the response data, participants were required to be so called "Masters," who had completed at least 1,000 tasks on Amazon Mechanical Turk, with a minimum of 95 percent approval rate from requesters of those surveys. After cleaning the data to include only religious Christians (41 percent of initial total participants) and non-religious, i.e., atheists and agnostics (46 percent of initial total participants), we ended up with 178 religious Christian participants and 199 non-religious participants.

We find that the impact on donations from thoughts is determined by an empathy effect, while the impact from prayers is determined by the net outcome of two effects: the empathy effect and a substitution effect. Below, we discuss what to expect about the size and sign of those effects in our particular context, and use this knowledge to construct a brief formal model that provides theoretical predictions about the affect of thoughts and prayers on charity donations.

2.1. The empathy effect

Empathy increases prosocial behavior (Hoffman, 1984; Batson, 1987; Eisenberg and Miller, 1987; Eisenberg and Fabes, 1990), and empirical studies on charity donations specifically find that higher empathy leads to higher donations (Fisher et al., 2008; Zhou et al., 2011). Both intercessory thoughts and prayers may boost empathy for others, through increasing awareness of others' hardships, and thereby increase donations. The idea that thoughts increase awareness of a phenomenon has long influenced experimental study design – numerous experimental studies ask participants to think of a phenomenon as a method to vary salience of the phenomenon (e.g., Sadler and Tesser, 1973; Ross, 1975; Miller and Mulligan, 2002). Other studies use frequency of thoughts as a measure of salience of a phenomenon (Quinn and Chaudoir, 2009; Castano et al., 2011). Specific to prayers, the Bible entails the following statement by Jesus: "But I say to you, love your enemies and pray for those who persecute you." (Matthew 5:44), implying that the act of praying may increase compassion for those distant from us. The above suggests that both thoughts and prayers conducted on behalf of others may increase empathy – they generate an empathy effect.

The idea of increased empathy from thoughts and prayers was supported by our survey responses. Survey participants were asked to state if they agree/disagree/neither agree nor disagree with a set of statements on the impact of intercessory thoughts and prayers on the

awareness of, and empathy for, those receiving the intercessory gesture. Figure 1 shows the share of participants who agreed with each statement.

[Insert Figure 1 here.]

Figure 1 shows that a majority of participants who may pray (i.e., religious Christian participants) agree that intercessory prayers increase awareness and empathy. Statistical tests support this interpretation of the results in Figure 1. A one sample test of proportions suggests that the share of religious Christians who agrees intercessory prayers increase awareness (S_{agree}=0.758, SD=0.429) is significantly higher than 50 percent ($z(178)$=6.896, p<0.001). Similarly, the share of religious Christians reporting intercessory prayers increase empathy (S_{agree}=0.848, SD=0.360) is significantly higher than 50 percent ($z(178)$=9.294, p<0.001).

Further, a majority of those who may spend a moment to think of someone in hardship (i.e., both religious Christians and non-religious) agree intercessory thoughts increase awareness and empathy. Specifically, the share of participants reporting that intercessory prayers increase awareness (S_{agree}=0.676, SD=0.468) is significantly higher than 50 percent ($z(377)$=6.850, p<0.001) as is the share reporting intercessory prayers increase empathy (S_{agree}=0.708, SD=0.455), ($z(377)$=8.086, p<0.001). The results in Figure 1 support the idea that both thoughts and prayers generate an empathy effect.

2.2. The substitution effect

Intercessory thoughts and prayers may be perceived as moral actions that directly impact the well-being of recipients, just like donations. If so, such gestures may also generate a substitution effect on donations. Praying for others – intercessory prayers -- is a fundamental element of Christianity. The Bible particularly highlights the intercessory prayer as a tool that saves others from sin and helps them find God or God's forgiveness. For instance, the Bible states that Jesus, when crucified, said "Father, forgive them, for they know not what they do." (Luke 23:34). Or the following passage, by the apostle James: "Is anyone among you sick? Let them call the elders of the church to pray over them and anoint them with oil in the name of the Lord. And the prayer

offered in faith will make the sick person well; the Lord will raise them up. If they have sinned, they will be forgiven. Therefore confess your sins to each other and pray for each other so that you may be healed. The prayer of a righteous person is powerful and effective." (James 5:14-16). These examples illustrate a common theme in the Bible, that intercessory prayers make a difference for others – the act of praying is "powerful and effective." The idea that a person's prayer directly impacts other people's well-being is so fundamental to Christianity that intercessory prayers are part of alternative medicine practices in the U.S. (Masters et al., 2006).

The above suggests that intercessory prayers may be regarded as moral actions. There is a lack of similar indicators of intercessory thoughts being perceived (or not) as directly helpful to recipients. Here, we therefore rely on survey responses alone, see Figure 2.

[Insert Figure 2 here.]

As shown by Figure 2, a majority of religious Christians expect prayers to directly benefit recipients. A one sample test of proportions suggests that the share of religious who believe their prayer may relieve some of the recipient's distress (S_{agree}=0.680, SD=0.468) is significantly higher than 50 percent, $z(178)=4.797$, $p<0.001$), as is the share of religious who agree that praying feels like helping (S_{agree}=0.674, SD=0.470), $t(178)=4.647$, $p<0.001$). In contrast, we find a small minority of those who may take a moment to think of someone in distress (both religious and non-religious) expect benefits generated from thoughts. The share of religious and non-religious who believe their thought may relieve some of the recipient's distress (S_{agree}=0.220, SD=0.415) is significantly lower than 50 percent ($z(377)=-10.867$, $p<0.001$), as is the share of religious and non-religious who agree that thinking feels like helping (S_{agree}=0.271, SD=0.445), $t(377)=-8.910$, $p<0.001$). Hence, those who pray for others generally perceive the intercessory prayer to be a moral action, while thoughts are not. As such, prayers may correlate with subsequent moral actions, such as charity donations. We label this correlation a substitution effect.

While our findings support the idea of a substitution effect that is unique to intercessory prayers, the sign of the effect is ambiguous and may be context dependent. Existing theories

offer mixed predictions about the relationship between moral actions. Some theories suggest consumers strive to be consistent in their behavior, such that one moral action (e.g., an intercessory prayer) is followed by another moral action (e.g., a charity donation). For instance, self-perception theory (Bem, 1972) proposes that by conducting an initial moral action, a person may infer she is a moral person, which incentivizes subsequent moral actions. Other prominent theories that stress consistency as a motivator for consumer behavior are the balance theory (Heider, 1946) and the cognitive dissonance theory (Festinger, 1957). Some social influence techniques, designed to incentivize compliance with a cause (e.g., charity donations) build on this strive for consistency (e.g., the foot-in-the-door-technique, Freedman and Fraser, 1966). According to these theories, the substitution effect positively affects donations (suggesting complementarity, instead of substitution), just like the empathy effect. In contrast, the literature on moral licensing (for a meta-analysis, see Blanken et al., 2015) suggests the substitution effect is negative. Moral licensing theory assumes people strive to uphold, or balance, a moral identity, such that if a moral action is conducted that confirms that moral identity, the consumer can afford to be less moral in a subsequent task, without jeopardizing his/her moral identity, i.e., the first moral action acts as a "license" to engage in subsequent, less moral, behavior. Particularly relevant to our study is research that finds moral licensing in charity donations. Sachdeva et al. (2009) find that people donate less to charity if first asked to think of positive personality traits. Jordan et al. (2011) find that people asked to recall immoral behavior report greater participation in moral activities and prosocial intentions.

A related body of research suggests people may be motivated to actively look for a license (excuse) not to donate (Dana et al., 2007; Grossman, 2014; Hertwig and Engel, 2016; Gigerenzer and Garcia-Retamero, 2017; Golman et al., 2017; Grossman and van der Weele, 2017). Prayers, especially if themselves regarded as helpful, may provide that excuse. Specific to charity donations, DellaVigna et al. (2012) and Andreoni et al. (2017) find people avoid the ask to donate. Exley and Petrie (2018) find that people strive to rationalize a decision not to donate. Further, Gruber (2004) finds that when charitable giving is subsidized, religious attendance decreases, implying that people may be motivated to avoid situations with high social pressure to donate. Like the moral licensing theory, the literature documenting avoidance of donations suggest the substitution effect may be negative.

2.3. The size and sign of the empathy and substitution effects in the context of highly salient natural catastrophes

We expect the empathy effect from thoughts and prayers to be small in contexts where pre-gesture empathy is high. Consequently, we expect the empathy effect in the current study to be small, since we examine the impact of thoughts and prayers on donations to victims of highly salient natural catastrophes.

The direction of the substitution effect may be more context specific, given the conflicting theories on whether moral actions (here, prayers and donations) are complements or substitutes. We turn to studies that examine contexts in which either of these theories is more likely to explain moral behavior. Kristofferson et al. (2013) examine what determines if moral actions are guided by consistency (suggesting a positive substitution effect) or moral licensing (suggesting a negative substitution effect). They find that higher saliency (to self and others) of the initial action increases the probability of the initial and subsequent moral actions being substitutes. The prediction of Kristofferson et al. (2013) is supported by previous studies that find moral actions are more likely to be complementary when consumers are in a state of automaticity, or "mindlessness" (Langer, 1992; Cialdini and Goldstein, 2004; Fennis and Janssen, 2010). The awareness in our experiments of taking a moment to think or pray for donation victims is likely high, due to the explicit and unusual request to undertake any of those actions. Further, Conway and Peetz (2012) find moral licensing is particularly likely to occur when moral actions are close in time, which is also the case in our study (the ask to undertake the intercessory gesture directly precedes the ask to donate). Based on the above, we assume that the substitution effect of prayers on donations in the context of our study is negative.

2.4. A formal model on the impact of thoughts and prayers on charity donations

We use the above knowledge to develop a brief formal model of the utility from donating that allows us to compare the size of donations when a donor has not prayed or taken a moment to think ("baseline") to donations when having prayed, and donations when having taken a moment to think of the donation beneficiary. We assume that the donor is an "impure altruist," who engages in altruism because he/she cares both for the personal satisfaction from doing good

("warm glow") and others' well-being.[2] The donor can be either a religious Christian or non-religious.

We start by characterizing utility from donating of a person who prays. This utility function pertains to Christians only, as we do not expect non-religious to pray. Next, we characterize the baseline utility function and utility when taking a moment to think of the beneficiary. In contrast, these utility functions pertain to both religious Christians and non-religious, given both Christians and non-religious can take a moment to think of someone or undertake no activity at all before donating.

Utility when having prayed. We assume that the donor chooses how much to donate to a representative beneficiary (e.g., a hurricane victim). The donor has an endowment, *e*, and can donate any positive amount, d_i, less than or equal to *e*. We propose that the religious Christian donor *i* who prays for the beneficiary chooses the donation that maximizes

$$U_i = e - d_i + g(d_i) + \alpha_{i,r} v(\beta_i r + d_i) \qquad i = 1, \dots, n. \tag{1}$$

The third component in the utility function represents the direct utility received by the donor from donating – the warm glow. We assume this component is strictly increasing and concave. We further assume that $g(0) = 0$. The last component of the utility function represents the donor's altruism towards the beneficiary and is the beneficiary's utility, as perceived by the donor. This component is affected by both the empathy effect and the technical substitution effect. The beneficiary's utility is premultiplied by a weighting factor, $0 < \alpha_{i,r} < 1$, that parameterizes the extent to which the donor is altruistic (via feelings of empathy) when having prayed for the beneficiary (subscript "*r*" for prayer). Further, the donor perceives prayers and monetary donations to be substitutes in the utility of the beneficiary, and $\beta_i > 0$ is a conversion factor that represents the perceived efficiency of the prayer in directly adding to the beneficiary's well-being. We assume $v(\beta_i r + d_i)$ is strictly increasing and strictly concave.

[2] Andreoni (1989; 1990) distinguishes between "pure altruists", who are altruistic only because they care for other's well-being, "pure egoists", who care only for their own well-being and therefore only engage in altruistic behavior if it generates "warm glow" that directly benefits their own utility, and "impure altruists", who engage in altruism because they care for both the warm glow and others' well-being. Evidence suggests that donors to public goods are typically "impure altruists," who receive personal utility ("warm glow") from the act of giving itself and also genuinely care for the beneficiaries' well-being (e.g., Crumpler and Grossman, 2008; Eckel and Grossman, 2003).

Utility when having taken a moment to think. A donor who takes a moment to think about the situation of the beneficiary chooses the monetary donation, d_i, that maximizes

$$U_i = e - d_i + g(d_i) + \alpha_{i,t} v(d_i). \quad (2)$$

The three first components of the utility function are the same as in (1). As suggested by the above, the donor perceives no direct benefits to the beneficiary from the thought. The fourth component therefore differs from the corresponding component in (1) -- the beneficiary's utility is perceived to depend on d_i alone. The weighting factor for the beneficiary's utility is $0 < \alpha_{i,t} < 1$, and encompasses the empathy, and therefore altruism, from taking a moment to think of the beneficiary.

Utility at baseline. At baseline (no thoughts, no prayers), donor *i* chooses the monetary donation, d_i, that maximizes

$$U_i = e - d_i + g(d_i) + \alpha_{i,b} v(d_i) \quad (3)$$

Again, the three first components of the utility function are the same as in (1). Since no prayer is undertaken, the beneficiary's utility is perceived to depend on d_i alone. The beneficiary's utility at baseline is premultiplied by the weighting factor, $0 < \alpha_{i,b} < 1$ (subscript "*b*" for baseline). Given that both the act of praying and taking a moment to think of the beneficiary's situation increases empathy, which has an unambiguously positive (but decreasing) effect on altruism, $\alpha_{i,b} \leq \alpha_{i,r}$ and $\alpha_{i,b} \leq \alpha_{i,t}$.

The solutions to (1), (2) and (3), $d^*_{i,j}$, are given by first-order condition

$$g'(d_i) + \alpha_{i,j} v'(.) = 1 \qquad j = b,r \text{ or } t. \quad (4)$$

The second LHS component of (4) differs depending on if the donor prayed for the beneficiary, took a moment to think of the beneficiary, or did nothing (baseline). First, note that $v'(.)$ will be lower when having prayed, compared to if the donor took a moment to think or at baseline, since $\beta_i r + d_i > d_i$, for all d_i. Second, by assumption, $\alpha_{i,b} \leq \alpha_{i,r}$ and $\alpha_{i,b} \leq \alpha_{i,t}$.

Specific to our context, a highly salient natural disaster, our simple analytical framework proposes the following:

1. Given $\alpha_{i,t} \geq \alpha_{i,b}$, then $d^*_{i,t} \geq d^*_{i,b}$. A non-negative empathy effect causes the act of thinking to have a non-negative effect on charity donations, compared to baseline.
2. If $\beta_i > 0$ and $\alpha_{i,r} \geq \alpha_{i,b}$ but small, as suggested by our context, then $d^*_{i,r} < d^*_{i,b}$. In words, if the donor perceives his/her prayer to positively impact the beneficiary's well-being, while the act of praying has minimal impact on the empathy of the beneficiary's well-being, then a prayer crowds out donations.

3. Empirical analysis

We test for the net impact of thoughts and prayers on charity donations using a series of three incentivized experiments in which participants are given the opportunity to donate actual money to victims of natural catastrophes. The experiments consist of a main experiment, and two subsequent experiments that examine the robustness of the key results from the main experiment across two different frames, given experimental results are often sensitive to framing (Tversky and Kahneman, 1981; Fagley and Miller, 1997; Kühberger, 1998; Levin et al., 1998). Follow-up experiment 1 examines the robustness of our results over the frame of a different hurricane in continental USA – hurricane Florence, versus hurricane Harvey. Follow-up experiment 2 examines the robustness of our results over the donation elicitation mechanism. Follow-up experiment 2 entails ten times smaller donations and a cognitively less demanding donation decision, compared to the other two studies. Apart from these changes in frames, we kept the experimental scripts used in both follow-up studies as close as possible to the experimental script used in our main study.

3.1. Main experiment

The objective of our main experimental study is to examine the impact of intercessory thoughts and prayers on donations, across religious Christians and non-religious people. The study entails monetary donations to hurricane Harvey victims, via the Red Cross, three months after hurricane Harvey's landfall. Hurricane Harvey made landfall in Texas August 25, 2017, causing major and lasting devastation.

3.1.1. **Experimental design and data**

The study has three treatments. In the first treatment (*treatment baseline*), participants were informed about the current (i.e., three months after landfall) situation of hurricane Harvey victims, and thereafter given the opportunity to donate. In the second treatment (*treatment pray*), participants received the same information about the current situation of the hurricane Harvey victims, then they were asked to pray for the victims, and finally they were given the opportunity to make a donation to the victims. In the third treatment (*treatment think*), participants received the same initial information, and were asked to take a moment to think about the victims, before given the opportunity to donate. For obvious reasons, *treatment pray* entailed religious participants only. The other treatments entailed both religious and non-religious participants, to enable comparisons of treatment responses of both religious and non-religious participants.

Given the ask to pray for someone as part of a study is unusual, several steps were taken to minimize any potential discomfort associated with this ask. First, we chose to conduct the experiment online. Participants may be more uncomfortable praying, or taking a moment to think about hurricane Harvey victims, if observed by a monitor (i.e., in a laboratory or "lab-in-the-field" context). The online environment also reduces the "experimenter effect," which has been found to be important particularly when measuring prosocial behavior (Caviola and Faulmüller, 2014). Second, religious participants were restricted to Christians only (who, however, account for 65 percent of Americans, see Pew Research Center, 2019). Christians may pray any time of the day, while it is common for other major religions (e.g., Islam, Buddhism) to pray during fixed times of the day. The ask to pray as part of our study would therefore risk being more awkward for people who belong to religions other than Christianity. Third, to increase the likelihood that the religious participants were familiar with the act of praying, the screening of religious participants who could participate in this study entailed the requirement that they believe in God. Finally, the ask to pray was worded in a way not to pressure the participants to pray, if uncomfortable doing so. The precise wording of the ask was the following: "We now kindly ask you to please take a moment and pray for the hurricane Harvey flooding victims, if you feel comfortable doing so."

The non-religious participants in the study were atheists or agnostics. To ensure participants met the desired religiosity criteria, they were recruited by the research firm Qualtrics, from the

Qualtrics consumer panel. While the recruitment cost per participant is higher when recruiting via Qualtrics than recruiting from for instance Amazon Mechanical Turk or Turk Prime, the advantage of using the Qualtrics panel is higher data quality. Qualtrics continuously performs quality checks of participants, ensuring background characteristics are accurate, and avoids professional survey takers, thereby reducing the risks associated with other online panels (e.g., see Chandler and Paolacci, 2017, and Sharpe Wessling et al., 2017).

Recruitment was based on the following instructions: 225 religious participants (and 150 non-religious participants, i.e., 375 participants in total. These participants would be distributed over treatments as follows: *treatment baseline*: 75 religious participants, 75 non-religious participants; *treatment pray*: 75 religious participants; *treatment think*: 75 religious participants, 75 non-religious participants. Screening of participants was done based on two questions, one that elicited religious affiliation and one that asked about belief in God. To qualify as religious Christians, participants had to identify as Protestant or Catholic and had to state that they believe in God. To qualify as non-religious in our study, participants had to identify as atheist or agnostic and had to state that they either denied or were unsure of God's existence. All participants were required to be U.S. residents. Due to oversampling in the recruitment, we received more participants than requested, amounting to 401 participants in total. Religious participants were randomized into *treatment baseline*, *treatment think* or *treatment pray*, while non-religious participants were randomized into *treatment baseline* or *treatment think*. The experimental script for the main experiment can be found in the Electronic Supplementary Material (ESM).

The experimental study was conducted in the following steps:

1. All participants were asked questions on common demographics (gender, age, income, religion). These questions were at the front of the experimental survey, since they were used as screening questions for recruitment. To reduce the focus on religion, we, however, also asked a few questions on behavior irrelevant to the study (frequency of buying organic food, spendthriftiness, political affiliation).
2. All participants were asked to read the following short text about the hardships caused by hurricane Harvey, and how the Red Cross helps.

Hurricane Harvey was a category 4 storm that hit Texas in late August 2017, and affected people from Texas through Louisiana, Mississippi, Tennessee and Kentucky. Please read the below text from the Red Cross about the impact of hurricane Harvey, the worst flooding disaster in U.S. history (American Red Cross, "Hurricane Harvey, One-month-Update," October 2017):

"When survivors returned to their homes, they faced unimaginable destruction. Entire homes were torn to pieces or waterlogged and coated with mud. Vehicles, appliances and furniture were damaged, and ruined belongings stacked in piles on the street. While residents labored to salvage what they could, Red Cross workers visited flood-ravaged neighborhoods to provide food, water and essential relief and cleanup supplies.

Recovery from a disaster of this magnitude will take months and even years. Many people are still unable to return home, and thousands more are just beginning the long process of putting their lives back together."

3. *Treatment baseline*: participants were informed that they had been endowed with $5, which they could use for donations to the Red Cross, to help hurricane Harvey victims. Anything they did not donate, they would get to keep.
   Treatment pray: participants were asked to pray for the hurricane Harvey victims. Participants were asked a follow-up question on if they did pray or not. They were thereafter subjected to the same donation information as participants in *treatment baseline*.
   Treatment think: participants were asked to take a moment to think about the hurricane Harvey victims. Participants were thereafter asked if they did take a moment to think about the hurricane victims or not. They were thereafter subjected to the same donation information as participants in *treatment baseline*. The time participants in *treatment pray* and *treatment think* spent on the page with the ask to think/pray was recorded.
4. Participants decided on their donation to the hurricane Harvey victims, via the Red Cross.
5. Participants answered questions on if they had previously donated to hurricane Harvey victims, and if they, or someone close to them, had been a victim of a natural catastrophe.

Table 1 shows descriptive statistics. Of all participants, 60 percent are religious, of which about half identify as Catholic and half as Protestant, and 40 percent are non-religious. Most

non-religious participants are atheists, only 14 percent were agnostics. About half of participants (52 percent) are female. The average age is 46 years and the average annual income is 74,000. About 42 percent of participants stated that they had previously donated to hurricane Harvey victims (i.e., before participating in our study), and 45 percent of participants stated that they themselves, or someone close to them, had been a victim of a natural catastrophe.

[Insert Table 1 here.]

Of our participants, 162 (religious and non-religious) participated in *treatment baseline*, 80 (religious only) participated in *treatment pray* and 159 (religious and non-religious) participated in *treatment think*. Of participants who participated in *treatment pray*, 87.5 percent (70 participants) did pray for the hurricane victims in response to the ask. Participants who prayed spent an average of 16 seconds doing so, as measured by the time they spent on the page that entailed the ask to pray. Of participants in *treatment think*, almost 97 percent (154 participants) did take a moment to think about the victims in response to the ask. Those who took a moment to think about the victims spent on average 12 seconds doing so, measured by the time participants spent on the page that entailed the ask. (This variable, *time to think*, entails two extreme values – 0 and 426 seconds. We have performed sensitivity analysis excluding these values from our analysis and our results remain robust.)

3.1.2. **Results**

Figure 3 and Table 2 show mean donations across treatments and sub-groups (religious and non-religious). The donation variable is skewed to the left, with spikes around $0 and $5, such that a non-parametric test of equality of distributions is appropriate for hypothesis testing. For comparison, we, however, also report results from two-sided *t*-tests.[3]

[3] Given the two tests are concerned with different null hypotheses, these tests could generate conflicting results -- means may be equal over two groups, while the overall distribution is not. However, we encountered no conflicting results over these tests, only marginal differences in *p*-values.

Although the mean donation in treatment think (M_{think}=2.16, SD=2.295) appears to be higher than the mean donation in treatment baseline ($M_{baseline}$=1.86, SD=2.233), we cannot reject the null hypothesis that they are the same (Wilcoxon-Mann-Whitney: $z(321)=1.171$, $p=0.241$; two-sided *t*-test: $t(321)=1.152$, $p=0.250$). As expected, any empathy effect in the context of our study is small, and may therefore be hard to detect statistically. This result remains robust when we break down the data by religion. For religious participants, we cannot reject the null hypothesis that donations in treatment think (M_{think}=2.38, SD=2.299) are the same as in treatment baseline ($M_{baseline}$=1.98, SD=2.286), (Wilcoxon-Mann-Whitney: $z(162)=1.061$, $p=0.289$; two-sided *t*-test: $t(162)=1.110$, $p=0.269$). The same holds for non-religious participants -- we cannot reject the null hypothesis that donations in treatment think (M_{think}=1.94, SD=2.284) are the same as in treatment baseline ($M_{baseline}$=1.75, SD=2.185), (Wilcoxon-Mann-Whitney: $z(159)=0.589$, $p=0.556$; two-sided *t*-test: $t(159)=0.54$, $p=0.592$). Hence, although mean donations are higher when preceded by thoughts, we cannot statistically detect an effect of thoughts on donations.

[Insert Figure 3 and Table 2 here.]

In contrast, donations made by religious participants in *treatment pray* (M_{pray}=1.23, SD=1.896) are significantly lower than donations made by religious participants in *treatment baseline* ($M_{baseline}$=1.98, SD=2.286), (Wilcoxon-Mann-Whitney: $t(163)=2.067$, $p=0.039$; two-sided t-test: $t(163)=2.282$, $p=0.024$). Given non-religious people are not part of our *treatment pray*, the more interesting test is that entailing religious participants only. However, if we include also the non-religious participants in *treatment baseline*, our results remain robust -- we find that donations in *treatment pray* are significantly lower than in *treatment baseline* (Wilcoxon-Mann-Whitney: $z(239)=2.878$, $p=0.004$; two-sided *t*-test: $t(239)=3.130$, $p=0.002$). Hence, prayers crowd out donations.

Also, donations by religious participants in *treatment pray* are significantly lower than donations by religious participants in *treatment think* (Wilcoxon-Mann-Whitney: $z(159)=3.205$, $p=0.001$; two-sided t-test: $t(159)=3.45$, $p<0.001$). Praying for the hurricane Harvey victims significantly reduces monetary donations, compared to taking a moment to think about the

victims, which offers further support for the idea that the act of praying is uniquely different from taking a moment to think about the hurricane victims.

The results reported in Figure 3 and Table 2 are consistent with the predictions from our analytical framework – intercessory prayers crowd out donations (implying the substitution effect dominates the empathy effect from prayers), while thoughts do not.

We examined the robustness of our findings using multivariate regression analysis. Although Freedman (2008) argues that regression estimates from randomized experiments may be biased if covariates are included, Lin (2013) shows this concern is valid only under very specific circumstances. Further, Athey and Imbens (2017) and Mutz et al. (2017) argue it is appropriate to control for variables that are a priori expected to impact the outcome variable. We expected participants who had donated to hurricane Harvey victims before participating in our study to be less inclined to donate as part of our study, and participants who had been a victim of a natural catastrophe to donate more, as suggested by Small and Simonsohn (2007). In the multivariate regression, we therefore controlled for if participants had previously donated and if they, or someone close to them, had been a victim of a natural catastrophe.

Given that donations were limited to $0-$5 in our experiment, we applied a censored regression model -- a Tobit regression with right-censored data (upper limit 5). Our assumption that the donations data is right-censored only is based on the belief that no (or very few) who chose to donate nothing would have wanted to take money from the hurricane victims. (Given such a scenario is, however, not entirely implausible, see Bardsley (2008), we have also estimated models with both right-censoring and left-censoring at $0. Doing so increases the magnitude of the coefficients, while results remain robust in terms of level of significance and direction of the effects.) Results from the multivariate regression support the findings from both the non-parametric tests and *t*-tests, see Appendix A, and imply that the act of praying results in a donation that is around $1 lower than donations in baseline.

A few alternative explanations to our results grant some discussion. For instance, could it be that participants who are asked to pray donate less in our experiment out of protest, i.e., due to being put off by the ask to pray? Although we cannot rule that out, we have carefully designed our experiment with that in mind – the religious participants, context and the wording of the ask have all been chosen with the intent of minimizing discomfort from the ask to pray. Could the act

of praying infuse suspicion of the American Red Cross? Pew Research Center (2014) finds that people who frequently pray are more inclined than those who seldom/never pray to perceive aid to poor as unhelpful. This might translate into a general suspicion of the extent to which charity from larger aid organizations, such as the American Red Cross, is helpful to receivers. However, in our study, the act of praying (and thinking) is exogenously varied, and it is difficult to imagine why the act of praying itself would trigger more suspicion, relative to suspicion held by religious participants in other treatments. Could participants who pray be more inclined than others to look for alternative ways to donate to hurricane victims after having been asked to pray in the experiment (e.g., other charity organizations, or their church)? Participating in the experiment likely raises awareness of the hurricane victims, which might cause participants to recall alternative channels for donations that they have seen in the past. Again, there is, however, no reason to expect religious participants who pray to be more inclined than other religious participants to use those alternative channels for their donations.

Our results imply that donors treat a prayer as distinctly different from a thought, and our analytical framework suggests they are different because people perceive prayers to be directly helpful to recipients, while thoughts are not. An alternative difference that may give rise to the observed asymmetry in crowding out across prayers and thoughts is if intercessory prayers are less cognitively costly than thoughts. Fennis et al. (2008) find that complementarity between moral actions is more likely when the initial moral action depletes the ego. Similarly, Gneezy et al. (2012) find that moral actions that are costly are more likely to lead to subsequent moral actions. While we cannot observe the amount of mental resources used up from praying versus taking a moment to think, we can observe time spent praying and thinking of the hurricane victims. Assuming that the duration of the actions is a proxy for the effort that goes into thoughts and prayers, we examine if time spent praying differs from time spent thinking of the beneficiaries. We excluded participants who were part of *treatment nothing* as well as those in *treatment pray* and *treatment think* who stated they did not pray/take a moment to think from our analysis. We also excluded the single clear outlier of 425.964 seconds in *treatment think*. However, we find that religious participants spent significantly *more* time praying for the victims (M_{pray}=16.15, SD=22.161) than thinking of the victims (M_{think}=10.57, SD=17.146), (Wilcoxon-Mann-Whitney: $z(159)$=-2.963, p=0.003; two-sided t-test: $t(159)$=-1.775, p=0.078). Hence, based on the assumption that time spent on the gesture is a proxy for mental effort/cost, our data do not

support the alternative explanation that crowding out of donations from prayers occurs because intercessory prayers are less costly than intercessory thoughts.

3.2. Follow-up experiment 1

Follow-up experiment 1 examines the robustness of the key result from the main experiment – that prayers crowd out donations -- across a different hurricane location in continental USA. Hurricane Florence made landfall in North Carolina on September 14, 2018, and the study was conducted within weeks after landfall. We recruited 170 Christian participants who stated they believed in God from the Qualtrics consumer panel to participate in the experiment. Participants were randomized into one of two treatments – *treatment baseline* (87 participants) and *treatment pray* (83 participants). As in the main experiment, participants in both treatments read a short text on the devastation caused by the hurricane (here, Florence). Participants in *treatment baseline* were thereafter given the opportunity to donate any amount \$0-\$5 to the victims of the hurricane, via the Red Cross, while participants in *treatment pray* were asked to pray for the victims, before donating. Appendix B, Table B1, entails descriptive statistics.

We find that donations are significantly lower in treatment pray (M_{pray}=1.51, SD=2.037) than in treatment baseline ($M_{baseline}$=2.06, SD=2.188), (Wilcoxon-Mann-Whitney: $z(170)=1.877$, $p=0.061$; one-sided t-test: $t(170)=1.70$, $p=0.046$). This result is robust to the inclusion of covariates in the analysis, as shown by Appendix A. This supports the finding in the main experiment that prayers crowd out donations, implying that this results is robust across hurricane location in continental USA.

3.3. Follow-up experiment 2

In Follow-up experiment 2 we examined if crowding out from prayers is sensitive to the donation elicitation mechanism. Like in Follow-up experiment 1, participants were offered to make donations to Hurricane Florence victims and the study was conducted within weeks after landfall.

In the main experiment, half of Christian participants in *treatment baseline* (42/83) donated \$0.50 or more. We used this as a benchmark for the donation amount in Follow-up experiment 2, where participants were asked to make a binary choice to either donate \$0.50 to hurricane Florence victims, or nothing. We recruited participants for this experiment from Amazon

Mechanical Turk. We addressed potential data quality issues by requiring that all participants be "Masters" participants, who had completed at least 1,000 tasks on Amazon Mechanical Turk, with a minimum of 95 percent approval rate from requesters of those surveys. Further, a text question (asking about participants' favorite color) was added last in the survey, to screen for nonsense answers that could signal the survey was taken by a bot. We required participants to be U.S. residents.

Apart from the substantially smaller maximal possible donation ($0.50 versus $5), and the binary donation choice, the experimental script was preserved as closely as possible to the one used in our main study. In total, N=326 participated in the study. After selecting on participants who reported being Christian and believe in God, N=277 remained for our analysis. Appendix B, Table B2, shows descriptive statistics.

The share of religious participants donating $0.50 in *treatment baseline* is 46 percent (45/98), which is similar to the corresponding share in our main study. In fact, Pearson's test of equality of proportions implies we cannot reject the null hypothesis that these shares are the same (χ^2=0.395, p=0.530, N=181). However, in this study, the share of religious participants donating $0.50 in *treatment pray* is 52 percent (47/90), which is larger than in *treatment baseline* (46 percent), although this difference is not statistically significant (χ^2=0.746, p=0.388, N=188). Our main finding in this follow-up experiment is that we observe no crowding out from prayers of donations, suggesting that the prayers-donations effect is sensitive to the donation elicitation mechanism. Specifically, our results imply that when possible donations are small, people no longer perceive prayers as substitutes for monetary donations.

This study also entails *treatment think*, to test if our results in the main experiment for *treatment think* would hold up with a different donation elicitation mechanism. It did -- the share donating $0.50 in *treatment think* was 48 percent, i.e., almost the same as the share in *treatment baseline* (47 percent). We cannot reject the null hypothesis that these shares are the same (χ^2=0.108, p=0.743, N=187).

Why do we not observe crowding out from prayers in this experiment, while we did in the other two? The key difference between this experiment and the other two experiments is that the cost of donating is lower. In this experiment, the possible dollar donation is one tenth of the possible donation in the other two experiments. Also, the cognitive cost of donating is lower -- a

binary choice is cognitively less demanding than deciding on a continuous amount. One potential explanation for the difference in crowding out across this and the other experiments is therefore that the monetary stakes in this experiment are too small to matter to participants, meaning the experiment closely resembles a non-incentivized stated-preference survey. If so, we might want to attach less weight to these experimental results, compared to the results generated by the other two experiments.

Another potential explanation is that the smaller stakes and lower cognitive cost of donating causes prayers to be more of a commitment device, as captured by the "foot in the door" technique. A "foot in the door" means that if a person undertakes a costless moral action, he or she may be more likely to undertake a subsequent costly moral action (see e.g., Freedman and Fraser, 1966; Deci and Ryan, 1985, Jacquemet et al., 2018). The classic study is Harris (1972), who found that people are more likely to give a panhandler a dollar if the panhandler first asks for the time of day. People who give away the time for free are more committed to give a dollar. Scott (1977) found that the smaller the cost of the second task (in our study, the donation), the more effective is the foot in the door technique, i.e., the more likely it should be that the intercessory prayer becomes complementary to donations, as opposed to a substitute. Our analytical framework suggests that thoughts provide no direct benefits to recipients, which means thoughts cannot be a "foot in the door." The impact on donations of thoughts should therefore be unaffected by the donation elicitation mechanism, which is also what we find.

While we cannot determine the mechanism behind the absence of crowding out in this experiment, it seems worthy of future research. It would be encouraging if indeed the absence of crowding out is driven by increased complementarity between prayers and donations (as opposed to incentives being too low to matter to participants), suggesting that the relationship between prayers and donations may vary across contexts. Future research might then explore frames and contexts that increase the complementarity between prayers and material help.

4. Conclusions

Intercessory thoughts and prayers are a routine first response to people affected by major catastrophes, such as natural disasters, mass shootings and other personal hardships. Yet, nothing

is known about their impact on accompanying prosocial behavior. In a first study, we find that such gestures may have important crowding-out effects. When offering experimental participants the opportunity to donate to hurricane Harvey victims, we find that intercessory prayers crowd out monetary donations by $1, while we find no crowding out from intercessory thoughts. The crowding out from prayers is consistent with the idea that prayers increase the empathy for hurricane victims, but that the positive impact on donations from this empathy effect is dominated by a negative substitution effect -- prayers, like donations, are perceived as directly beneficial to hurricane victims, such that they may replace monetary donations. We examine the robustness of these results across different frames – hurricane location and donation elicitation mechanism. We find that results are robust to hurricane locations in continental USA. In contrast, we find that the preference elicitation mechanism impacts our results. Low monetary and cognitive cost to donating may increase the complementarity between prayers and monetary donations.

Our analytical framework suggests we are more likely to observe our empirical findings -- crowding out of donations from prayers, and no effect on donations of thoughts -- in contexts where the (marginal) empathy effect of the act of praying or taking a moment to think of others is small. This should be expected in contexts where salience of the recipients' well-being is already high. Our empirical results might therefore be particularly relevant for events like major public risks, such as natural disasters and mass shootings, that are substantially covered in mass media. Studies often use the extent to which mass media covers an issue as a proxy for issue salience (Kiousis, 2004; Helbling and Tresch, 2011). Mass media coverage also boosts online discussions on an issue, further increasing its saliency (Roberts et al., 2002). It is likely that the baseline treatment in our experiments mimics such a high-salience baseline. First, the impact of hurricane Harvey was extensively covered in media, such that participants in our main experiment were likely to have some knowledge of the hurricane victim's situation already before participating in our study. Second, the devastation from hurricane Florence was still covered in media when the follow-up experiments were conducted. Third, in the beginning of the experiment, all participants, in all experiments, were informed about the current conditions of the hurricane victims, before being asked to pray or take a moment to think of the victims. We encourage future studies to examine if the impact of thoughts and prayers on donations is different in contexts where baseline salience is low. We also encourage future studies to examine

the impact of thoughts and prayers on prosocial behavior in contexts where saliency of the beneficiaries is high for reasons other than media exposure. For instance, studies find that identifiers of the beneficiaries increase prosocial behavior (Jenni and Loewenstein, 1997; Small and Loewenstein, 2003).

Our results suggest that calls for thoughts and prayers in response to major catastrophes (whether conducted individually or by entire communities) might affect related prosocial behavior in unexpected and important ways. Further, our finding that an intercessory prayer is regarded as a moral action is significant. It suggests our study may have identified one of the most frequently used accompanying moral action to material help from Americans. Although we do not know the extent to which intercessory prayers are conducted, the general act of praying is common – a majority of Americans pray on a daily basis (Pew Research Center, 2014). There is rich evidence that moral actions correlate, as suggested by influential consumer behavior theories dating back more than half a century (e.g., Heider, 1946; Festinger, 1957; Freedman, and Fraser, 1966; Monin and Miller, 2001). Identifying prayers as moral actions therefore strengthens the idea that prayers affect other moral actions, including prosocial behavior. Theories on moral actions are conflicting -- some argue moral actions are substitutes, others argue they are complements. This is, however, encouraging, since it implies certain contexts or calls for prayers may increase the complementarity of prayers and prosocial behavior, which could perhaps also be inferred from the "non-results" of prayers on donations in our second follow-up experiment.

Our results imply victims of natural disasters may be financially worse off from people expressing their sympathy through the act of praying. Our results do, however, not mean that recipients of prayers are worse off in terms of welfare. It is entirely possible that a recipient of prayers assigns a positive (monetary) value to a prayer, which may or may not exceed the value by which monetary donations drop due to the act of praying. In fact, Thunström and Noy (2019) find that Christians attach a substantial positive value to receiving intercessory prayers in support of overcoming hardships (as well as thoughts, if sent by fellow Christians). Hence, Christians may perceive themselves to be better off from receiving intercessory prayers, even when accounting for any crowding out observed in the current study. In contrast, Thunström and Noy find that atheists and agnostics are prayer averse – they assign a substantial negative value to receiving prayers. Hence, they may both lose out from the gesture itself and suffer a financial

loss, as implied by the current study. (It is, however, likely difficult for people to accurately assess the value of receiving thoughts and prayers in times of hardship -- see Sunstein (2019) for an excellent discussion of the difficulties of measuring the value of information, and Zeckhauser, (1996) for an overview of how people respond irrationally to catastrophes). The social value of thoughts and prayers will also be determined by any external effects from thoughts and prayers not covered in this study. For instance, it is possible that publicly expressed thoughts and prayers (e.g., on social media) increase the general salience of an issue, thereby indirectly affecting overall material help – an effect not captured in our experiments.

This is a first, exploratory, examination of the impact of intercessory thoughts and prayers on prosocial behavior. We encourage future research to examine the robustness of our results across different frames, contexts, social distance, and prosocial behavior. Further, the sensitivity of our results across donation elicitation mechanisms suggests future research may explore mechanism designs – we encourage future research to examine what designs might increase the complementarity between prayers and donations, thereby reduce any crowding out.

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Figure 1. *Awareness and empathy from thoughts and prayers*

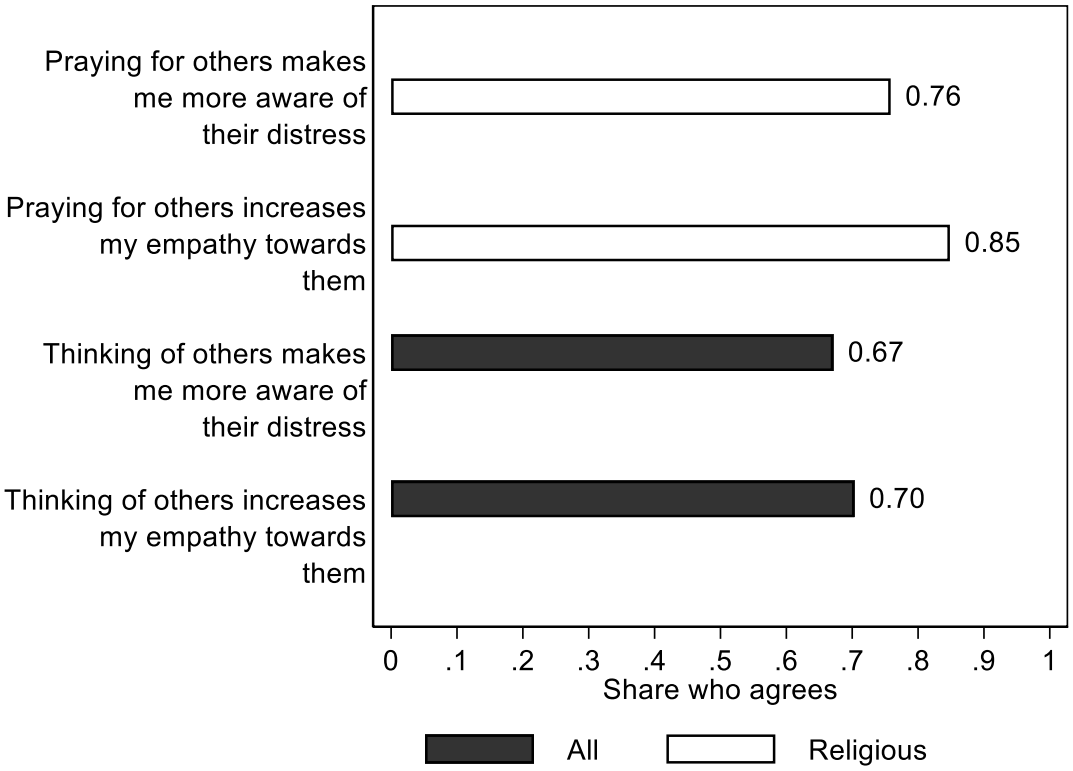

Figure 2. *Perceived direct benefit from thoughts and prayers*

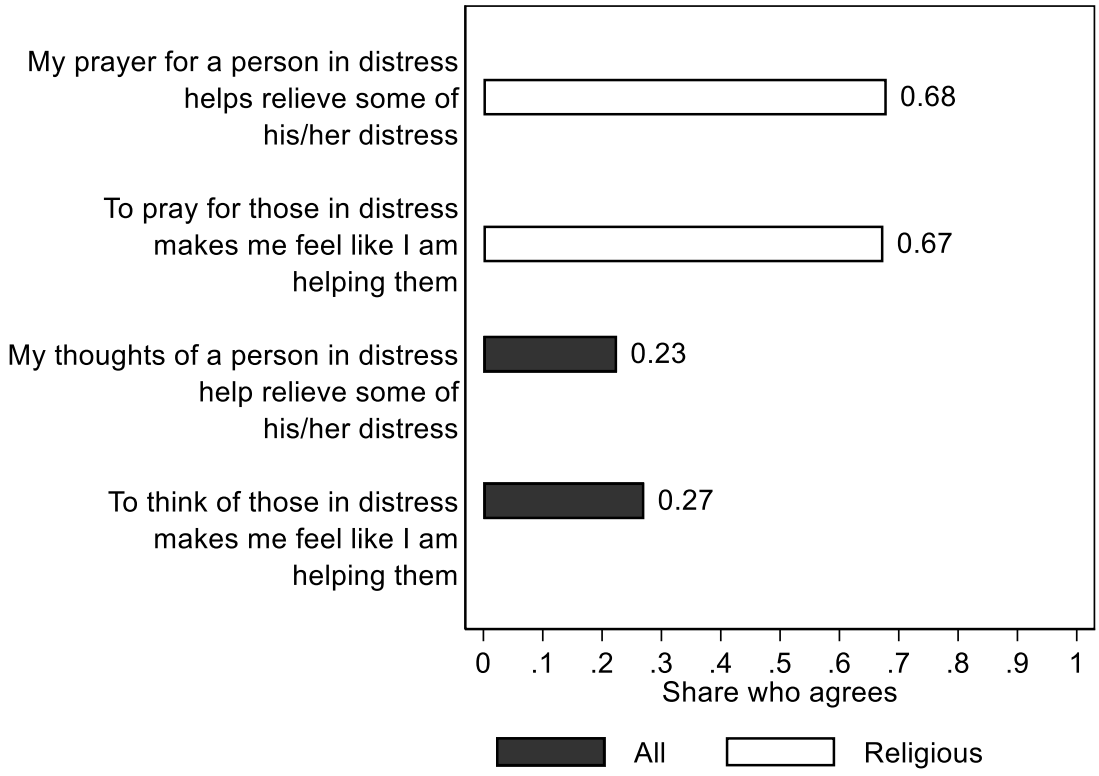

Figure 3. *Average amount donated (main experiment)*

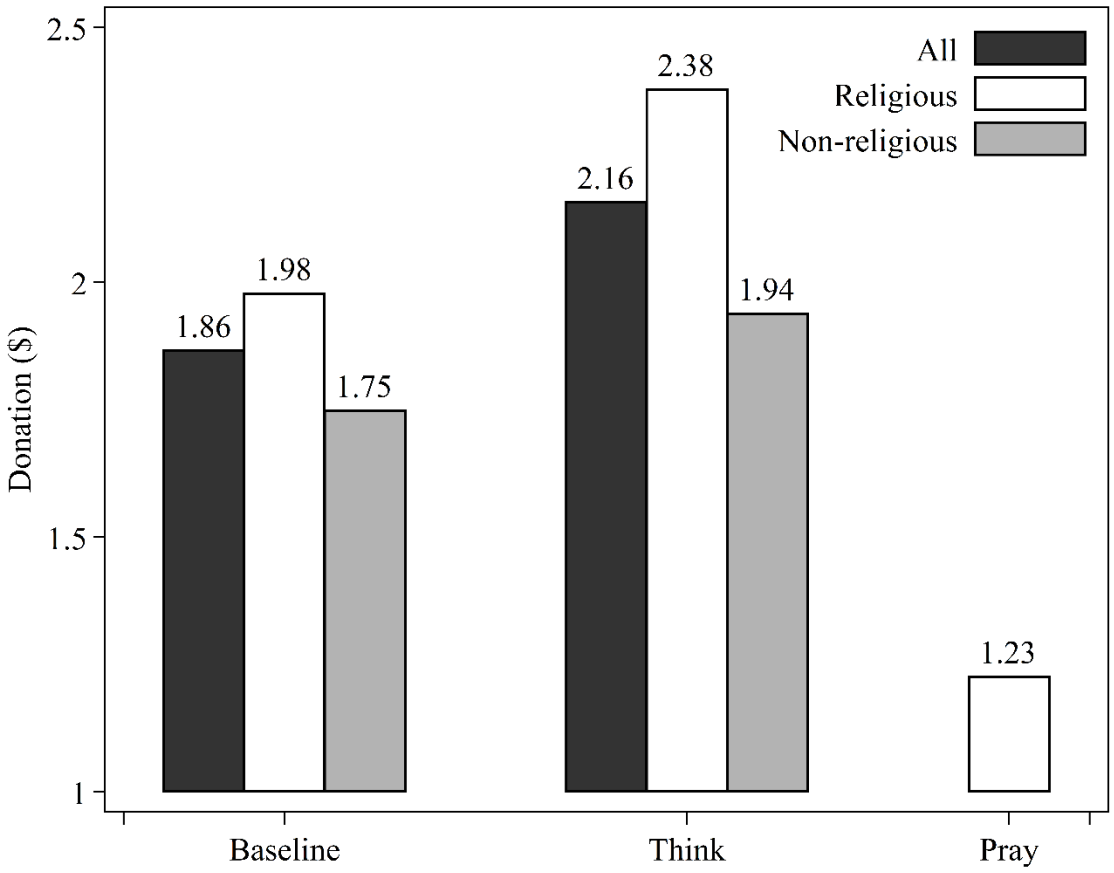

Table 1. *Summary Statistics – Main experiment*

	N	Mean	Std. Dev.	Min	Max
Donations, in USD	401	1.853	2.217	0	5
Made a donation	401	0.491	0.501	0	1
Donated max (USD 5)	197	0.584	0.494	0	1
Religious	401	0.603	0.490	0	1
Catholic	241	0.537	0.500	0	1
Protestant	242	0.463	0.500	0	1
Frequency pray	242	3.744	1.617	0	6
Non-religious	401	0.397	0.490	0	1
Atheist	159	0.862	0.346	0	1
Agnostic	159	0.138	0.346	0	1
Believe in God	401	0.603	0.490	0	1
Female	401	0.524	0.500	0	1
Age	401	46.204	16.575	18	82
Income	401	73.722	41.140	12.500	137.500
Democrat	401	0.516	0.500	0	1
Republican	401	0.289	0.454	0	1
Neither Dem nor Rep	401	0.195	0.396	0	1
Previously donated	401	0.416	0.494	0	1
Been victim	401	0.451	0.498	0	1
Baseline treatment	401	0.404	0.491	0	1
Treatment pray	401	0.200	0.400	0	1
Did pray	80	0.875	0.333	0	1
Time spent praying	70	16.145	22.176	1.033	132.117
Treatment think	401	0.397	0.490	0	1
Did think	159	0.969	0.175	0	1
Time spent thinking	154	12.018	38.120	0	425.964

Table 2. *Monetary donations over treatments and sample sub-groups – Main experiment*

Treatment	N	Mean donation in USD	Std. Dev.
Baseline treatment	162	1.865	2.233
Religious	83	1.977	2.286
Non-religious	79	1.747	2.185
Treatment pray[a]	80	1.225	1.896
Religious	80	1.225	1.896
Treatment think[b]	159	2.156	2.295
Religious	79	2.377	2.299
Non-religious	80	1.938	2.284

[a]Includes religious subjects only. Of the 80 subjects in Treatment pray, 70 subjects stated that they did pray for the hurricane victims. For those 70, the mean donation is 1.314, Std.Dev. 1.930. [b] Of the 159 subjects in Treatment think, 154 subjects stated that they did take a moment to think about the hurricane victims. 75 of those subjects were religious (mean donation 2.371, Std.Dev. 2.329), and 79 were non-religious (mean donation 1.962, Std.Dev. 2.288).

Appendix A – Robustness of results when considering covariates in the analysis

Main experiment

Table A1. *Relationship between prayers, thoughts and donations – religious subjects, Main experiment*

	Religious subjects only	
	(1)	(2)
	Donation	Donation
Treatment baseline (reference)		
Treatment pray	-1.047**	-1.012**
	(0.447)	(0.443)
Treatment think	0.510	0.430
	(0.515)	(0.505)
Previously donated		0.701
		(0.407)
Been victim		0.362
		(0.411)
Constant	2.500***	1.950
	(0.377)	(0.438)
N	242	242

Robust standard errors in parentheses. Models are estimated by Tobit regression, censored at the maximum donation of $5. lnsigma is the log of the estimated standard error of the regression. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Follow-up Experiment 1

Table A2. *Relationship between prayers and donations – follow-up Experiment 1*

	Religious subjects only	
	(1)	(2)
	Donation	Donation
Treatment baseline (reference)		
Treatment pray	-0.789*	-0.859**
	(0.432)	(0.429)
Previously donated		0.050
		(0.514)
Been victim		0.982**
		(0.482)
Constant	2.536***	2.214**
	(0.357)	(0.375)
N	170	170

Robust standard errors in parentheses. Models are estimated by Tobit regression, censored at the maximum donation of $5. lnsigma is the log of the estimated standard error of the regression. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Follow-up Experiment 2

Table A3. *Relationship between prayers and choice to donate – follow-up Experiment 2*

	Religious subjects only	
	(1)	(2)
	Donation	Donation
Treatment baseline (reference)		
Treatment pray	0.063	0.069
	(0.073)	(0.072)
Treatment think	0.024	0.028
	(0.073)	(0.073)
Previously donated		-0.183
		(0.134)
Been victim		0.061
		(0.060)
N	277	277

Entries show average marginal effects, i.e., Pr($n|y$=1) − Pr($n|y$=0), given all independent variables are dummy variables, generated by a Probit model. Dependent variable: the binary choice to donate or not. Standard errors are in parentheses.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Appendix B – Descriptive statistics of samples in Follow-up Experiments

Table B1. *Summary statistics – Follow-up Experiment 1*

	N	Mean	Std. Dev.	Min	Max
Donations, in USD	170	1.788	2.127	0	5
Donations, *baseline treatment*	87	2.057	2.188	0	5
Donations, *treatment pray*	83	1.506	2.037	0	5
Catholic	170	0.424	0.496	0	1
Protestant	170	0.576	0.496	0	1
Female	170	0.635	0.483	0	1
Age	170	56.853	13.883	22	92
Income	170	51.912	38.341	12.500	137.500
Democrat	170	0.365	0.483	0	1
Republican	170	0.459	0.500	0	1
Neither Dem nor Rep	170	0.176	0.382	0	1
Previously donated	170	0.259	0.439	0	1
Been victim	170	0.347	0.477	0	1
Baseline treatment	170	0.512	0.501	0	1
Treatment pray	170	0.488	0.501	0	1
Did pray	83	0.952	0.215	0	1
Time spent praying	79	21.541	19.713	1.091	104.441

Table B2. *Summary statistics – Follow-up Experiment 2*

	N	Mean	Std. Dev.	Min	Max
Share that made donations	277	0.487	0.501	0	1
Share that made donations in *baseline treatment*	98	0.459	0.501	0	1
Share that made donations in *treatment think*	89	0.483	0.503	0	1
Share that made donations in *treatment pray*	90	0.522	0.502	0	1
Catholic	277	0.372	0.484	0	1
Protestant	277	0.628	0.484	0	1
Female	277	0.505	0.501	0	1
Age	277	40.213	10.983	22	72
Income	277	45.984	29.184	12.500	137.500
Been victim	277	0.455	0.499	0	1
Baseline treatment	277	0.354	0.479	0	1
Treatment pray	277	0.325	0.469	0	1
Did pray	90	0.944	0.230	0	1
Time spent praying	85	34.247	49.853	2.252	305.106
Treatment think	277	0.321	0.468	0	1
Did think	89	1.000	0	0	1
Time spent thinking	89	11.868	12.428	1.599	78.235