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Cooperation and Coordination Across Cultures and Contexts: Individual, Sociocultural, and Contextual Factors Jointly Influence Decision Making in the Volunteer's Dilemma Game

Christopher Y. Olivola[1], Yeonjeong Kim[2], Avi Merzel[3], Yaakov Kareev[3], Judith Avrahami[3], & Ilana Ritov[3]

1) Carnegie Mellon University, Tepper School of Business
2) Massachusetts Institute of Technology, Sloan School of Management
3) Hebrew University

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Please Address Correspondence to:
Chris Olivola
Tepper School of Business
Carnegie Mellon University
Pittsburgh PA, 15213, USA
olivola@cmu.edu

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Abstract

What factors promote or hinder volunteering within organizations and groups? This paper simultaneously explores the impact of individual, contextual, and socio-cultural variables on decision making in a special type of social dilemma: The volunteer's dilemma game (VDG). The VDG provides a controlled experimental method for studying volunteering behaviors in an anonymous interactive environment. We developed six variations of the VDG and administered them to economics students in five different cultures (N_{total} = 603). Among other things, these VDGs varied whether the potential benefits of volunteering were certain or uncertain. While the overall level of volunteering did not vary substantially across most cultural groups, we found that culture interacted with the size and (un)certainty of the benefits associated with volunteering, to influence volunteering decisions. We also found that religiosity (but not religious affiliation per se) increases volunteering, and that men are less likely to volunteer when the returns to doing so are certain. These results extend our knowledge of behaviors in the VDG, and their potential drivers, with clear implications for understanding how culture, individual characteristics, and context jointly influence prosocial behavior and coordination.

1. Introduction

Life often conspires to create social dilemmas –situations that test our willingness to pay a small cost in order to produce a greater collective benefit. Consider, for example, the following true story (Chung, 2010; Szabo, 2010):

A 36-year-old American woman had gotten lost in a 300-acre forest while competing in a mini-triathlon. In her attempt to rejoin the race, she had a brutal accident that left her injured and unable to move. Too injured to walk, too isolated to successfully call for help, and stranded in an area with poor phone reception, she used her mobile phone to send out a call for help to all of her followers on the social networking service Twitter. More than a 1,000 people immediately received her message. Within seconds, several of these Twitter followers (most of whom had never met her) picked up their phones and called for help. Within minutes, she heard an ambulance coming to rescue her.

Now consider the dilemma faced by each one of her individual Twitter followers: They could call for help, leading to her likely rescue, or they could not call and hope someone else would do so, thereby also risking her suffering or death. Each of them (presumably) preferred that she were rescued rather than suffer or die, even if doing so meant having to call for help. On the other hand, calling the police for help involves a non-negligible cost in time, and a risk of experiencing frustration and/or embarrassment[1]. Furthermore, this effort would be wasted if another of her Twitter followers were already prepared to make the call. This example illustrates a special type of social dilemma called the "Volunteer's Dilemma" Game (VDG; Diekmann, 1985; see also Franzen, 1999). Understanding how people react to this dilemma has implications for organizational behavior, economic models, social psychology, and evolutionary theories of cooperation (as we explain below).

In this paper we use the VDG to study various factors that influence people's likelihood of volunteering and whether groups of individuals can achieve efficient levels[2] of cooperation. In particular, we simultaneously examine how contextual variables (payoff size, payoff uncertainty, and

[1] For example, the caller might have to navigate a maze of menus and pre-recorded messages, and experience a long wait time, before reaching the dispatcher to report the emergency. Moreover, the caller might feel embarrassed that he/she "wasted" his/her time and the dispatcher's time if he/she learns that he/she is the n^{th} person to have reported the same emergency. Even if he/she is one of the first callers, he/she still faces the challenge of explaining what happened to the police (including the seemingly puzzling fact that the injured woman was able to send a call for help but could not call the police herself) and where they might find her (within the 300-acre forest).

[2] By "efficient levels", we mean that they neither volunteer so frequently that their efforts are too often wasted (because others have already chosen to volunteer), nor that they volunteer so rarely that they too often end up in situations where no one volunteers (and all are worse off as a result). Or, to put it another way, "efficiency" here means selecting a likelihood of volunteering such that higher rates of volunteering would be wasteful (i.e., too many people needlessly volunteer) and lower rates would yield excessive missed opportunities (i.e., too often, no one volunteers).

group size), individual characteristics (gender and religiosity), and socio-cultural factors (culture and religion) shape the willingness to incur a cost in order to achieve greater personal and collective benefits. As we explain below, these factors are potentially interesting and important determinants of volunteering; and yet, they have not received much (or any) attention in the VDG literature. In fact, to the best of our knowledge, this is the first study that tests the effects of culture, religiosity, and the (un)certainty of the gains associated with volunteering on decisions in the VDG.

We begin by describing the VDG and discussing relevant background literature, then consider unanswered questions regarding factors that influence volunteering in the VDG, before presenting our study.

2. The Volunteer's Dilemma Game

2.1. Overview and Background

As the story above illustrates, each person in the VDG has to decide whether or not to pay a cost (e.g., of having to deal with the police hotline), knowing that there are other people (e.g., other recipients of the Twitter message, in the above example) who might also do so, and that it suffices that only one person pays this cost (e.g., of calling for help). Furthermore, there are no additional gains from having more than one person volunteer. Therefore, one's efforts are wasted if another person has already decided to volunteer. At the same time, it is in the interest of all to attain the benefit (e.g., saving the friend). The VDG differs from other social dilemma games in several aspects. First, volunteering has a positive payoff: the benefit from volunteering exceeds its cost, even to the volunteer. Thus, if a player were alone (e.g., if the friend had sent a message to only one recipient) he/she would definitely volunteer. This is in contrast to public goods games, where the returns on cooperating are most often negative. Another difference is that the number of volunteers does not change the gains earned: costs are not shared (as they are in the 'Snowdrift' game, e.g., Kümmerli et al., 2007), and benefits do not accumulate (as they do in the public goods game).

Within game theory and economics, the volunteer's dilemma has been formalized as a game in which every player has to decide whether or not to pay a fee in order to improve the lot of all players. The contribution of one player is sufficient to attain the benefit but every player who chooses to pay must do so –irrespective of what the other players choose. Thus, if no one volunteers then no one receives the benefit; if a player does not volunteer but someone else does, the player receives the full

benefit; and if a player volunteers, that player receives the benefit minus the cost of volunteering. All players make the decision (to volunteer or not) simultaneously. Critically, while all players benefit from one person volunteering, these benefits do not increase further if more than one player volunteers. Therefore, there is a coordination and efficiency problem to be solved in the VDG: every player prefers to volunteer if no one else will, but volunteering becomes pointless if at least one other person is already going to do so. In other words, it is suboptimal if no one volunteers (as it represents a missed opportunity to increase final payoffs), but it is inefficient if several people volunteer (as it implies wasted "effort" on the part of every additional player, beyond the first, who volunteers). The game's payoffs are as follows:

Player	Number of other players who volunteer			
	0	1	…	$N-1$
Volunteers	B-C	B-C	B-C	B-C
Does not volunteer	0	B	B	B

Where B is the benefit of volunteering, C is the cost of volunteering, and $B > C$.

As with many economic games, there is an optimal strategy in the VDG if one assumes that other players are rational (in the economic sense). We can therefore derive predictions about what a set of rational players would do in the VDG, using the standard game theoretic solution based on the Nash equilibrium. The Nash equilibrium solution proposes that players select a strategy (or set of strategies) that best respond(s) to what the other players do. This, in turn, leads all players (in a symmetric game, such as the VDG) to converge on a set of choices that no individual could profitably deviate from (thereby leading to the stability of this particular equilibrium). While there are pure-strategy equilibria in the VDG, in which one of the players volunteers and the rest do not, and although this equilibrium is the most efficient one, it is not clear how it could be reliably reached (unless all players know that one of them can be particularly trusted to volunteer, which is not possible in an anonymously played game with no communication between players). Therefore, rational players are more likely to follow a mixed-strategy Nash equilibrium (for the derivation of this equilibrium, see Appendix A), whereby each person volunteers with likelihood P, which is jointly determined by the cost (C) and benefit (B) of volunteering, and the number of players in the game (N), according to following equation:

$$P = 1 - \left(\frac{C}{B}\right)^{\frac{1}{N-1}}$$

The VDG has been studied both theoretically and experimentally, and several factors have been shown to affect players' willingness to volunteer, including the number of players in the game (e.g., Diekmann, 1985, 1993; Franzen, 1995; Goeree et al., 2017; Healy & Pate, 2009; Murnighan et al., 1993; Weesie & Franzen, 1998) and the relation between the cost of volunteering and the benefit it provides (e.g., Murnighan et al., 1993; Weesie & Franzen, 1998).

Beyond economics and game theory, the VDG has also been used to explain the evolution of volunteering in a society (Chen et al., 2013; He et al., 2014; Myatt & Wallace, 2008), the vigilance behavior of prey animals (Archetti, 2010), and the functional dynamics of viruses, bacteria, amoeba, and yeast (Archetti, 2009). The VDG also relates to the social psychological literature on the diffusion of responsibility (also know as the "bystander effect" – Darley & Latané, 1968; Latané & Darley, 1968, 1970; Latané & Rodin, 1969; for a more recent review and meta-analysis see Fischer et al., 2011), whereby people are less likely to help a person in need of assistance (e.g., someone injured and calling for help) if others around them did not react to the incident. Moreover, the volunteer's dilemma serves as a model for a range of other social decisions, such as getting up at night to quiet a crying baby[3], cleaning shared toilets, taking out the garbage, developing open-source software, chairing a university department, academic peer review, and making the politically costly decision to veto an undesired outcome (Bilodeau & Slivinski, 1996; Franzen, 1999; Johnson, 2002; Myatt & Wallace, 2008; Northcraft & Tenbrunsel, 2011; Weesie, 1993, 1994). Finally, understanding behaviors in the VDG has important implications for organizational behavior (Kim & Murnighan, 1997; Murnighan et al., 1993). For example, Barron and Yechiam (2002) examined the diffusion of responsibility in a modern organizational environment by measuring responsiveness to an e-mail request for help, as a function of the number of e-mail recipients. They found that when the number of recipients was large, responsiveness was low and less helpful, as predicted by both game theory (the Nash equilibrium) and the bystander effect in social psychology. The VDG could also contribute to the rich literature on

[3] The situation involves a VDG between the baby's caretakers: only one of them needs to get up to sooth the baby, yet doing so benefits all caretakers (who are trying to sleep), including the volunteer(s). However, it is inefficient (in terms of lost sleep and wasted effort) if multiple caretakers (e.g., both parents) get up, since it is sufficient for one of them to do it. This is just one example of the many VDGs faced by households, as explained by Weesie (1993; p. 571): "For instance, household members face a volunteer problem in deciding who makes the tax declaration, who puts the garbage out, or who gets out of bed at night to comfort a crying child."

organizational citizenship behaviors (e.g., Cohen et al., 2014; Organ, 1988; Smith et al., 1983), typically defined as voluntary actions that go beyond one's specific job description, which are not explicitly rewarded by organizations, but which can nonetheless potentially boost organizational performance (Organ, 1988), and may therefore come to benefit organizations (and therefore, by extension, their employees). Specifically, the VDG –a tightly controlled experimental paradigm in which the decision to volunteer is clearly and rigorously operationalized– provides a novel research tool for organizational scholars interested in identifying macro- and micro-level factors that promote or hinder organizational citizenship behaviors. In sum, the VDG serves as a model for a wide variety of decisions faced by individuals, groups, organizations, and societies.

2.2. Unanswered Questions: Determinants, Predictors, and Moderators of Volunteering in the VDG

Although several studies have examined the VDG, it has nonetheless received far less attention than other social dilemma situations, such as the prisoner's dilemma or public goods games. One reason might be that VDGs are more complex, since the decision to volunteer could potentially be driven by a variety of different considerations. As previously explained, rational-economic considerations alone can drive cooperation in VDGs; that is, even purely self-interested players will be motivated to volunteer if they believe doing so increases their expected gains. However, these kinds of considerations will, in many cases, only produce a limited amount (or likelihood) of volunteering, defined by the Nash Equilibrium (described above). Of course, people may volunteer for prosocial reasons: perhaps they value helping others, derive pride from merely knowing that they contributed, and/or prioritize maximizing total (over individual) welfare. Such prosocial motivations would lead people to volunteer more (frequently) than the Nash Equilibrium predicts. Relatedly, high volunteering rates (i.e., exceeding the Nash Equilibrium) could be driven by a variety of social, cultural, and/or religious norms. On the other hand, a reluctance to be taken for granted ("why should I be the one to volunteer?") would inhibit volunteering if one suspects the other players have no intention of volunteering (i.e., that they hope to 'free-ride'). Conversely, the fear that one's investments will be wasted (Arkes, 1996; Olivola, 2018) if others already intend to volunteer could also inhibit volunteering. Then there is the opposite concern, with *not* volunteering, that one *could have* been the decisive volunteer (and thus guaranteed a greater payoff); specifically, the anticipation of regret (Connolly & Zeelenberg, 2002; Zeelenberg, 1999) from failing to volunteer when no one else does may drive greater volunteering. These various considerations related to counterfactuals (i.e., "what if…" concerns) also highlight the potential role of preferences

related to (un)certainty. VDG decisions and outcomes are characterized by multiple sources of uncertainty: uncertainty about the other players' motivations, uncertainty about whether someone else will volunteer, and in some cases (discussed below), uncertainty about whether volunteering will bring about the desired outcome. In 'standard' VDGs (where higher payoffs are guaranteed if someone volunteers), a strong preference for certainty (Tversky & Kahneman, 1986) and/or aversion to uncertainty (Gneezy et al., 2006; Newman & Mochon, 2012; Simonsohn, 2009) would motivate players to volunteer, as doing so removes any uncertainty about their final payoff, regardless of what the other players do. Similarly, an aversion to ambiguity (Borghans et al., 2009; Ellsberg, 1961) would motivate players to volunteer, as doing so removes the only source of ambiguity: the unknown probability that another player will volunteer. Of course, risk preferences (in the standard economic sense) could also govern how players respond to the various sources of uncertainty in VDGs, but their impact is more complex, and thus less obvious. For example, a general aversion to risk could either decrease volunteering rates if players mainly consider the potential downsides of volunteering (e.g., being taken for granted by others; wasted investments), or increase[4] volunteering rates if they mainly consider the potential downsides of *not* volunteering (e.g., failing to be the decisive volunteer). The complexity of VDG decisions increases even further when we take into account players' beliefs about the factors that promote or hinder volunteering in others. In particular, the very same considerations, discussed above, that promote (or hinder) volunteering could have opposite effects to the extent that players believe these factors (similarly) influence others' decisions. For example, uncertainty aversion could hinder (rather than promote) volunteering if players believe others are (also) uncertainty averse, and thus likely to volunteer. In sum, decisions to volunteer in VDGs are governed by a large, and diverse, array of potential factors.

Perhaps unsurprisingly, the existing literature has yet to consider --let alone fully map out-- all of these potential factors, or their relative contributions in shaping volunteering decisions. Indeed, it would be extremely difficult, if not impossible, for any single study (or even a few studies) to do so. As we mentioned above, this may help explain why the VDG has, so far, received far less attention than many other social dilemma games. The complexity of the VDG also makes it a richer, and therefore (in some ways) more useful, model for studying responses to real-world social dilemmas. The current paper

[4] Note that in most other social dilemma games (e.g., public goods game, trust game) any uncertainty about whether the other player(s) will cooperate should never increase the tendency to cooperate. The VDG is unique in that a rational player will be *more* likely to cooperate the *less* s/he believes the other player(s) will do so. Consequently, risk aversion can increase (not just decrease) cooperation in the VDG (unlike most other social dilemma games).

provides new evidence concerning some previously studied factors (e.g., the extent to which volunteering rates could be driven by rational-strategic considerations), as well as evidence concerning some factors that have not been previously examined (e.g., preferences for payoff certainty). Of course, we cannot (nor is it our goal in this paper to) fully identify and tease apart all potential drivers of VDG decisions; nonetheless, the current paper contributes to our understanding of which factors are more (or less) likely to be involved.

Furthermore, we examine how various characteristics, of both the VDG and its players, impact, predict, or moderate volunteering tendencies. While some features of the VDG have been well studied (e.g., the number of players, the costs and benefits of volunteering), a number of other variables have yet to be explored. The current study addresses several new questions concerning the willingness to volunteer in the VDG: (i) how the probabilistic/risky nature of the benefits to be gained from volunteering (as opposed to the deterministic/sure nature of the costs) affects the tendency to volunteer, (ii) whether different cultural environments (and norms) are associated with different volunteering tendencies, (iii) whether the decisions of men and women differ in (static) VDGs, (iv) whether religion and religiosity promote volunteering, and (v) whether sensitivity to features of the VDG (e.g., the size and certainty of the returns to volunteering) is moderated by individual and sociocultural variables. Understanding whether, when, and how certain VDG and player characteristics predict volunteering rates can, in turn, help us identify the most (and least) likely drivers of volunteering in the VDG. Below we describe the new VDG and player characteristics that we examine, and what they might tell us about the potential drivers of volunteering in the VDG.

2.2.1. The Effect of Certainty: Volunteering as a Decision Under Risk

Uncertainty is a critical, yet understudied, component of real-world social dilemmas (Van Dijk et al., 2004). Although the VDG has, to the best of our knowledge, only been studied in contexts where the effects of volunteering were guaranteed (i.e., where players were sure to benefit if someone volunteered), the returns to volunteering in real life are not always so certain. Consider our introductory anecdote about the Twitter rescue. Even if one or more persons call the authorities to help an injured friend stranded in the wilderness, this act of volunteerism cannot guarantee her rescue. It could be the case that the rescuers are unable to locate her in time, especially if the search area is very large. Conversely, failing to call for help doesn't guarantee her demise either if, for example, a wandering hiker happens to cross her path (and offers to help her). In many real life situations, the benefits associated

with volunteering are probabilistic rather than certain; they can be achieved, by chance, without anyone volunteering, or they can fail to be achieved even if someone (or everyone) volunteers. In these cases, the decision to volunteer (or not) is therefore a fundamentally risky choice –a fact that may change people's willingness to volunteer. In the current study we compare behaviors in the VDG when the benefit associated with volunteering is certain vs. probabilistic. We introduce a probabilistic version of the VDG in which volunteering raises the *probability* of earning an additional reward but does not guarantee it. In this probabilistic (i.e., 'uncertain' or 'risky') VDG, there is a probability that players receive the benefit even if no one volunteers and there is a probability that they do not receive the benefit even if one (or more) player(s) volunteer(s).

Critically, our probabilistic VDGs maintain the same expected values of volunteering (or not), so the Nash Equilibrium prediction is identical. Consequently, the decisions of rational, risk-neutral players should not be influenced by whether the returns to volunteering are certain or risky. In reality, however, willingness to volunteer may depend on the type of VDG that people face. Indeed, there are several reasons why people might volunteer less in probabilistic VDGs. They may be risk-averse (in the standard economic sense) or uncertainty averse (Gneezy et al., 2006; Newman & Mochon, 2012; Simonsohn, 2009). Moreover, ambiguity aversion (Borghans et al., 2009; Ellsberg, 1961) or a preference for sure outcomes (Tversky & Kahneman, 1986), would make volunteering in sure VDGs far more attractive, as it guarantees a higher payoff (relative to not volunteering). On the other hand, if people expect that others will volunteer less in probabilistic VDGs (e.g., for one or more of the reasons just discussed), this could make them *more* likely to volunteer in probabilistic VDGs. That is, greater pessimism about volunteering rates in risky VDGs may lead people to compensate by increasing their own volunteering rates. In sum, an important, yet unanswered, question is whether volunteering rates increase or decrease when volunteering no longer guarantees a higher payoff.

2.2.2. The Influence of Culture: Volunteering Tendencies Across Different Societies

To the best of our knowledge, no previous studies have examined whether and how behaviors in the VDG differ across cultural groups. Yet cultures differ considerably in the extent to which their members are expected to volunteer their time or other resources (e.g., Grönlund et al., 2011). In Balinese society, for example, members are regularly expected to contribute substantial amounts of their time (and other resources) to help their local community, and failures to do so are met with serious social sanctions (Veszteg & Narhetali, 2010). This is in contrast to many Western societies, where volunteering, while

applauded, is much less prevalent or expected of its members (Putnam, 2000). Therefore, to the extent that cultural norms are fully internalized and consistently applied, we would expect to see higher rates of volunteering among the Balinese than, say, the British, in the VDG. More generally, it is important to understand whether, and how, one's cultural background can influence volunteering in the VDG. Will cultural norms promoting volunteering within one's community extend to an abstract decision making context in which the other participants (and one's actions) are kept anonymous? Or is the decision to volunteer highly context specific? By comparing the volunteering tendencies of various cultural groups we can begin to answer these questions; in particular, we can examine the extent to which norms drive volunteering decisions in an anonymous, controlled setting (i.e., absent external pressures). To this end, we deliberately sampled participants from five very different cultural locations (Bali, England, India, Israel, and Java) that vary substantially in terms of their climates, languages, dominant religions, and norms regarding interpersonal behavior. Comparing volunteering rates in such different cultures provides a rigorous test of the robustness of preferences in the VDG, and of the potential for varying cultural norms to spillover into choices in an abstracted, anonymous context. It is also worth noting that this study is one of the few to compare how individuals in different cultures coordinate in an experimental game (see also Brooks et al., 2018; Jackson & Xing, 2014), since the VDG is also a type of coordination game.

2.2.3. The Influence of Gender: Do Women (Always) Volunteer More than Men?

While gender has been examined in other social dilemma games (e.g., Croson & Gneezy, 2009), no papers (to our knowledge) have rigorously compared the decisions of men and women in the standard (i.e., static) VDG[5]. This is surprising as gender dynamics likely play important roles in many volunteer dilemma contexts, such as household chores (Weesie, 1993) and organizational citizenship behaviors (Organ, 1988; Smith et al., 1983). Moreover, both lay intuitions and some theories would predict that gender might impact how likely a person is to pay a cost in order to improve collective welfare. For example, to the extent that popular stereotypes (Kite et al., 2008; Lippa, 2005; Spence & Buckner, 1995), and certain theories (e.g., Simpson, 2003), associate masculinity with self-interest, independence, and competitiveness, but femininity with caring, empathy, and harmony maintenance, they would expect

[5] Rapoport (1988) compared the decisions of men and women in the VDG but his sample sizes were too small to detect even large differences in volunteering rates (unsurprisingly, he found no significant gender differences). Babcock et al. (2017) examined gender in a *dynamic* variant of the VDG in which players had a limited time to make their volunteering decisions and only one person (the first one to contribute) could volunteer.

women to be more likely to volunteer in the VDG. On the other hand, given evidence that women tend to be more risk averse (Borghans et al., 2009; Byrnes et al., 1999; Croson & Gneezy, 2009; Eckel & Grossman, 2008b; Filippin & Crosetto, 2016), we might expect them to be less likely to volunteer in our risky VDGs. In fact, an intriguing possibility, which aligns with prior evidence (Croson & Buchan, 1999; Eckel & Grossman, 2008a), is an interaction between gender and the (un)certainty of returns to volunteering. Studies have found that men and women are equally cooperative when doing so is risky, such as when they are first movers in a trust game (Croson & Buchan, 1999) or proposers in an ultimatum game (Eckel & Grossman, 2008a), but that women are more cooperative when no risk is involved, such as when they are second movers in a trust game (Croson & Buchan, 1999) or the sole decider in a dictator game (Eckel & Grossman, 2008a). However, no studies have examined the interaction between gender and risk in VDGs. Nonetheless, given the prior evidence from other social dilemma games, we would predict that men and women will be equally likely to volunteer in risky VDGs, but that women will be more likely to do so in riskless VDGs. Our study will thus examine the role of gender and its interaction with risk.

2.2.4. The Influence of Religiosity: Do the (More) Religious Volunteer More?

Although religiosity has been examined in other social dilemma games (for reviews, see Galen, 2012; Hoffmann, 2013; Sablosky, 2014), no papers (to our knowledge) have examined it in VDGs. This is surprising as many religions strongly advocate volunteering (money, time, and other resources) in the service of the religious institution itself, to aid one's community, and to help others. More generally, most major religions prescribe the kind of prosocial behavior measured in the VDG: voluntarily sacrificing one's resources to benefit the collective. Given the important role that religion plays in motivating people to volunteer in their daily lives, we might predict that it would push them to volunteer in the VDG. Furthermore, many people believe, and a number of correlational studies suggest, that religion and religiosity are associated with greater prosociality in general, and with a greater propensity to volunteer in particular (Galen, 2012; Sablosky, 2014). In sum, there are several reasons (theological, intuitive, and correlational) to expect that religion and religiosity would impact how likely a person is to pay a cost in order to improve collective welfare. More specifically, we might predict that individuals affiliated with a religion are more likely to volunteer in the VDG, especially if they are (very) religious. Furthermore, to the extent that volunteering is considered a sacred duty (or a very strong norm), we

would predict that religious participants are less sensitive to the particular parameters of the VDG (e.g., payoff size and certainty), and more likely to volunteer unconditionally.

On the other hand, it turns out most prior experimental studies have found no significant relationship between religiosity and prosocial behavior in (other) social dilemma games (Ahmed & Salas, 2009, 2011; Akay et al., 2015; Anderson & Mellor, 2009; Anderson et al., 2010; Annis, 1975, 1976; Batson et al., 1993; Chuah et al., 2014; Eckel & Grossman, 2004; Grossman & Parrett, 2011; Hunsberger & Platonow, 1987; Orbell et al., 1992; Paciotti et al., 2011; Tan, 2006). Moreover, the few studies that did find a significant relationship did not directly ask about religiosity (Ben-Ner et al., 2004; Brañas-Garza et al., 2014) or confounded prosociality with in-group favoritism (Ahmed, 2009; Sosis & Ruffle, 2003 – see Galen, 2012). Similarly, it may be that religious participants are no more likely to volunteer in controlled VDG settings that eliminate the many potential confounds (e.g., lack of anonymity) inherent in real-life volunteering contexts.

In sum, it remains very much an open question whether religious affiliation and religiosity predict greater volunteering in the VDG (as lay beliefs and survey studies suggest) or whether they are unrelated to it (as experimental studies of other social dilemmas suggest). Our study will thus examine whether religion and religiosity motivate people to volunteer more frequently in the VDG. We will also examine whether religiosity reduces sensitivity to the VDG parameters and increases unconditional volunteering (i.e., whether religiosity promotes "blind" commitment to volunteering). To the best of our knowledge, this study is the first to consider the potential impacts of religion and religiosity on decisions in the Volunteer's Dilemma --that is, whether they predict volunteering even in the absence of external pressures (e.g., from other members of one's religion) to do so.

2.2.5. Interactions Between Individual Characteristics and Features of the VDG

In addition to any main (predictive) effects individual characteristics might have on general volunteering tendencies, they may also moderate (i.e., interact with) how players respond to the parameters of the VDG. For example, we already discussed possible interactions between gender and the certainty of returns to volunteering, as well as between religiosity and the size of those returns. Beyond gender and religiosity, culture may also moderate the impact of VDG parameters. Given that the normative strategy (i.e., the optimal likelihood of volunteering) in the VDG depends on the benefit and cost of volunteering, we manipulated this variable to see whether players from vastly different cultural backgrounds would similarly adjust their volunteering rates to fit the normative predictions of the Nash equilibrium. If so, it

would show that, regardless of culture, players are sensitive to normatively relevant variables. More generally, we varied several parameters of the VDG (the specific cost/benefit ratio, the number of players, and the certainty of returns to volunteering) to see whether (and how) they would influence volunteering levels across cultures. Two sets of VDGs involved two players but differed greatly in their cost/benefit ratios, while the third set involved three players but had a very similar Nash prediction (with regard to volunteering) as one of the two-player sets (see Table 1). Also, as previously explained, we presented participants with standard (i.e., sure) and probabilistic (i.e., 'uncertain' or 'risky') versions of these VDGs. Altogether, we used six different games, whose parameters are summarized in Table 1.

3. Experimental Design and Methods

To study the impact of these variables on volunteering, we carried out VDG experiments in five cultural locations: Bali (Indonesia), England, India, Israel, and Java (Indonesia). All of our participants were economics students, so the rules of the VDG were not too difficult for them to understand. Furthermore, by focusing on economics students, we minimize variance due to education, (relative) wealth, and other socio-economic variables that distinguish university-educated economics students from the rest of the population in each country. To examine the effects of the VDG environment, we presented every participant with the six VDGs described in Table 1 and Appendix B. This within-person, repeated measures design allows us to control for all individual fixed effects. Finally, we collected a number of demographic variables from participants (e.g., gender and religiosity) to examine how volunteering tendencies might also relate to individual-level factors. Importantly, the methods and procedures for carrying out the VDG experiments were the same in all five locations (as explained below).

3.1. Participants

Data were collected from a total of 603 economics students in five cultural locations:

(1) Bali, Indonesia: Responses were collected from 118 undergraduate economics students at Udayana University (Bukit Jimbaran Campus) (34% male, age range: 18-22, Median = 19 years).

(2) England, United Kingdom: Responses were collected from 164 undergraduate economics students at the University of Warwick (57% male, age range: 17-23, Median = 20 years).

(3) India: Responses were collected from 109 first-year Master's students at the Delhi School of Economics (44% male, age range: 19-29, Median = 21 years).

(4) Israel: Responses were collected from 110 undergraduate economics students at the Hebrew University in Jerusalem (64% male, age range: 21-33, Median = 25 years).

(5) Java, Indonesia: Responses were collected from 102 undergraduate economics students at the Universitas Indonesia (Depok Campus) (52% male, age range: 17-22, Median = 20 years).

3.2. Materials and Procedures

In all five locations, the experiment was conducted in economics classrooms. At the beginning or end of the class period, the students were invited to participate in the experiment. The experimenter briefly introduced the study and explained that it would allow them to win some money. The entire experiment was conducted via a pen-and-paper questionnaire, which was distributed, along with an empty white envelope, to each student who chose to stay and participate. Instead of writing their names on the questionnaire itself, a unique ID number was provided on the front page of each questionnaire packet and students were asked to write both their full name and this ID number on the envelope they were given. This was done so that responses on the questionnaire could not be linked to specific individuals. Both the experimenter (orally) and the front page of the questionnaire instructed participants to read the instructions and questions carefully, to complete all the questions in order without skipping ahead, to refrain from talking to anyone else during the study, to raise their hand if they had any questions (so that the experimenter could quietly assist the person), and to return the completed questionnaire and envelope when they had finished the study. Students were assured (by both the experimenter and the front page of the questionnaire) that their responses would remain anonymous.

Our study used a repeated measures design: Participants read and responded to all six versions of the Volunteer's Dilemma Game described in Table 1 and Appendix B. However, the order in which each version appeared on the survey was varied across participants. Using a Latin Square design, we created six different presentation orders (for one example, see Appendix B). Participants were randomly assigned to one of these order variations. This was achieved by using a random number generator to shuffle the questionnaires packets before distributing them to students.

The main part of the study was presented on two separate pages of the questionnaire (see Appendix B). The first page explained the general rules of these games (which were described to participants as "problems" rather than "games"). Specifically, it explained that each player would start with an initial endowment (4 points) and would have to decide whether or not to invest half of that amount (2 points) in order to (potentially) increase the payoffs of all the players in their group. In three

of these games (the certain/sure VDGs), every player would receive an additional *n* points if no one invested 2 points or an additional 2*n* points if at least one player invested 2 points. For the other three games (the uncertain/risky VDGs), players would first have to select a first-choice number and a second-choice number from a set of four possible numbers, before deciding whether to invest 2 points. Later, one of the four numbers would be randomly selected: if at least one player in the group had invested 2 points, then each player would receive an additional *m* points if their first- *or second*-choice number was selected; otherwise (if nobody had invested 2 points), they would only receive the additional *m* points if their first-choice number was selected (but not if their second-choice, or any other, number was selected). The first page of rules also informed participants that they would be making independent anonymous decisions, that one of the six games would be randomly chosen to be played for real, and that they would be randomly (and anonymously) matched with one or two other students in the class to determine their final payoffs. The second page provided the specific rules and parameters for all six versions of the Volunteer's Dilemma Game along with blank spaces for participants' responses. The final page of the questionnaire asked participants to report various demographic characteristics. For 4 out of the 5 cultural groups in our study (Israel being the only exception), we asked participants about their religiosity. Specifically, they were asked: "Do you consider yourself religious?" to which they responded either "Yes" or "No."

Although they were free to leave after they completed the study, participants were invited to stay in order to see which of the six games had been randomly selected to determine everyone's payoffs. Once the last participant had returned his/her completed questionnaire and envelope, the experimenter asked one of the students to roll a 6-sided die (in view of the whole class) which determined the game that would be played for real, and to announce the results to the rest of the class. In the event that one of the probabilistic (uncertain/risky VDG) games had been selected, a 4-sided die would be thrown (by the same student volunteer, in view of the whole class) to determine the winning number, so that players could see whether their first- or second-choice number had been selected. A computer algorithm later (after all questionnaires were completed and collected) randomly matched players with each other to form groups of two or three players (depending on the specific game chosen to determine payoffs).

Each student's payoff was later calculated (based on the specific exchange rate for that location) and the corresponding cash sum was put into the person's returned envelope. These sealed envelopes containing payments were later distributed to the participants by the experimenter. Each participant was asked to present his/her student ID card (to verify his/her identity) before receiving the sealed envelope

containing his/her payment. The exchange rates (i.e., conversion of points to cash) were chosen so that the expected payoff for each participant was equal to the standard hourly wage received by a student worker or research assistant in that location. This was done in an effort to equalize the value and purchasing power of the payment amounts that participants could earn in these games. The exchange rates were as follows: India = 15 rupees/point; Israel = 1.5 shekels (NIS)/point; Java and Bali = 6000 rupiah/point; England = 1 pound (GBP)/point.

4. Analyses and Results

The dependent measure in all of our analyses was the decision to volunteer (a binary variable). For our main analyses, we excluded participants who failed to provide useable responses on two or more games (out of the six). This left us with 561 participants (i.e., 93% of the initial sample). Our analyses are organized into three parts. First, we focus on the overall volunteering rate, calculated as the proportion of games in which a participant chose to volunteer. Next, we focus on the likelihood that someone is an "unconditional" volunteer –i.e., that they chose to volunteer in *every single* game, regardless of its parameters (number of players, payoff amounts, and certainty). Finally, we examine the likelihoods of volunteering across different types of games, as a function of their parameters. For the first two sets of analyzes, we examine how socio-cultural factors influence volunteering, using standard regression approaches; for the third set of analyses we instead employ a hierarchical linear modeling (HLM) approach to capitalize on the nested structure of the data (i.e., the fact that each participant responds to all six variants of the VDG).

4.1. Overall Level of Volunteering

The mean overall volunteering rate was quite high (M = 71%, SD = 26%), and did not differ significantly between cultural groups (one-way ANOVA: $F(4, 556) = .87$). Figure 1 presents the volunteering rates by cultural group. In all five cultures, the overall volunteering rate significantly exceeded the Nash prediction of 46% (the average predicted likelihood across the six games): all ts > 7, all ps < .0001.

As a more rigorous, and comprehensive, approach to examining the individual and cultural factors that influence the overall volunteering rate, we conducted a pair of regression analyses, the results of which are presented in Table 2. First, we regressed the overall volunteering rate on participant

gender and cultural group (dummy-coded, with England as the reference group[6]). As Table 2 shows, this analysis revealed no significant effect of any particular culture, and only a marginally significant negative effect of being male on the overall volunteering rate (i.e., ignoring possible interactions with features of the game). Second, we regressed volunteering rate on culture, gender, and whether the participant reported being religious. However, since we did not collect data on self-reported religiosity in Israel, we had to drop that cultural group from this second analysis. As Table 2 shows, this analysis revealed significant effects of gender, religiosity, and being Javanese (rather than English). Specifically, men volunteered less than women, religious participants volunteered more than non-religious participants, and Javanese participants volunteered less than English participants.

4.2. Unconditional (Consistent) Volunteering

A sizeable proportion of our participants (31%) volunteered consistently (i.e., chose to volunteer in *all* six VDGs). In contrast to these unconditional volunteers, the proportion of participants who *never* volunteered was less than 3%. Figure 1 presents the proportion of unconditional volunteers in each cultural group. As this figure shows, the proportion of unconditional volunteers differed slightly between cultural groups, but this difference was only marginally significant ($\chi^2(4) = 8.27$, $p = .082$, $\phi = .12$). Surprisingly, the rate of unconditional volunteering was highest in Israel and lowest in Bali. The finding that the rate of unconditional volunteering was more than fifteen percentage points higher[7] in Israel (a relatively individualistic culture) than in Bali (a highly collectivistic culture, in which there are strong social pressures to volunteer) is unexpected, and suggests that the decision to volunteer may be fairly context dependent[8] (we return to this point later, in the Discussion section).

As with the overall volunteering rate, we conducted a pair of regression analyses (logistic regressions, in this case), the results of which are also presented in Table 2. Regressing unconditional volunteering on participant gender and cultural group only revealed that Balinese participants were (only) marginally less likely (than English ones) to volunteer consistently. Regressing unconditional volunteering on culture (with Israel excluded), gender, and religiosity revealed that Balinese and Javanese participants were less likely to volunteer consistently than their English counterparts (although

[6] In all of our regression and HLM analyses, we selected England as the reference cultural group because the vast majority of experimental studies have recruited participants from Western countries (Henrich et al., 2010). As such, it seemed natural to have a Western country (England) serve as the baseline group, from which to compare the other cultures in our study.

[7] This difference was statistically significant: $\chi 2(1) = 5.33$, $p = .021$, $\phi = .16$.

[8] Note that the Balinese players in our study were quite homogeneous (in terms of age, ethnicity, and religious affiliation). Therefore, the lower rate of volunteering among the Balinese was not driven by an assumption that they were less likely to be paired with in-group members (i.e., players of the same age-group, ethnicity, and religion).

the Javanese effect was only marginally significant). While gender and religiosity influenced the overall volunteering rate, they did not significantly influence the likelihood that someone would be an unconditional volunteer.

4.3. Likelihood of Volunteering by Game Type

Finally, we analyzed the combined effects of participant-level variables (gender, religiosity, and culture) and game-level variables (number of players, payoff size, and certainty) on the likelihood of volunteering. Figure 2 presents the volunteering rates for each type of game and each cultural group. Two results are immediately clear from this figure: On one hand, all cultural groups were sensitive to payoff sizes (they were more likely to volunteer when doing so offered higher returns), as the logic of the Nash equilibrium would predict. On the other hand, volunteering rates consistently exceeded the predictions of the Nash equilibrium. Indeed, the only case in which they were lower was for Balinese participants playing the circle game (2 players, high payoffs, and risky returns to volunteering).

Given the nested structure of the data, with each individual responding to all six games (i.e., repeated measures), standard regression analyses are not appropriate (the assumption of independence is violated). Instead, we conducted binary logistic hierarchical linear model (HLM) analyses, with game-level variables simultaneously entered as level 1 (within-participant) predictors and participant-level variables simultaneously entered as level 2 (between-participants) predictors. Restricted penalized quasi-likelihood (PQL) estimation was used in all HLM analyses. The three level 1 (within-participant) predictors were entered as dummy variables using the coding scheme presented in Table 1 (bottom three rows). The level 2 (between-participants) predictors were entered as dummy variables using the same coding as before (in our previous regression analyses). To test whether the effects of VDG parameters (e.g., payoff size and certainty) are moderated by culture and other individual characteristics we model the interactions between each level 1 variable and each level 2 variable (but we only model main effects within each level). As with our previous regressions, we carried out two HLM analyses: one with all five cultures included and religiosity excluded as a predictor; a second one with Israeli participants excluded and religiosity included as a predictor. The equations detailing our HLM models are presented in Appendix C.

The results of our HLM analyses are presented in Table 3. First, we consider the main effects of player characteristics (i.e., between-participants variables) in the baseline (heart) game (i.e., low-payoff, two-players, and sure returns on volunteering). We found that men and Indian participants were less

likely to volunteer (than women and English participants, respectively), while religious participants were more likely to volunteer (than non-religious ones). Our second model also revealed that Javanese participants were marginally less likely to volunteer (than English ones). These results mirror many of those obtained in our analyses of the overall volunteering rate, where we also found negative effects of being male and Javanese, and a positive effect of being religious. Although those previous analyses did not reveal a statistically significant effect of being Indian, the direction was similar (i.e., negative). Nonetheless, our failure to find a significant effect for Indian participants on the overall volunteering rate suggests that the nature of the game may be a moderator (as we discuss below). We should note that the lower volunteering rate among Javanese participants (relative to English ones) was not consistently significant, or even marginally significant, across models, and therefore needs to be interpreted with caution.

Turning to the features of the games, we find that participants were much more likely to volunteer in the high-payoff games (square and circle), as Figure 2 suggested. Interestingly, this effect was significantly smaller for Balinese participants (i.e., the interaction between payoff and Bali was significant and negative). In other words, Balinese participants were less sensitive to payoffs when deciding whether to volunteer. In contrast to payoff size, we found no main effects of the other two parameters (number of players or riskiness of volunteering). However, we did find two significant interactions associated with riskiness. First, unlike women (who were unaffected by riskiness), men were more likely to volunteer in risky games (see Figure 3). Second, in contrast to the other cultural groups (which were unaffected by riskiness), Indian participants were much more likely to volunteer in risky games than in riskless games. The sensitivity of male and Indian participants to the (un)certainty of the returns to volunteering is interesting since Nash predictions are identical for both sets of games (as these are matched in terms of expected value).

5. Discussion

This paper simultaneously explored the influence of several factors on decisions in a special type of social dilemma situation: The volunteer's dilemma game (VDG). To examine these factors, we ran six variations of the VDG with economics students in five very different cultures. Across these six different VDGs, we varied the number of players in each game, the size of the benefits associated with volunteering, and the certainty of the returns to volunteering. As we explain in the Introduction section,

and in the next few sections, the variables we manipulated, along with the participant characteristics we measured, provide useful insights concerning the factors that promote or hinder volunteering.

The VDG provides a unique and tightly controlled method for studying volunteering behavior in an anonymous interactive environment. These desirable properties of the VDG have attracted, and indeed continue to attract, both theoretical and empirical interest from a variety of disciplines, including sociology (e.g., Diekmann & Przepiorka, 2016), economics (e.g., Myatt & Wallace, 2008; Feldhaus & Stauf, 2016), psychology (e.g., Krueger & Massey, 2009; Thomas et al., 2016), and biology (e.g., Archetti, 2009, 2010). And yet, while some factors (e.g., the number of players and the payoffs associated with volunteering) have previously been studied, the VDG has nonetheless received considerably less attention than other social dilemmas, such as the public goods game. To the best of our knowledge, the study we report is the first one to explore the effects of culture, religiosity, and the (un)certainty of the benefits associated with volunteering, on decisions in the VDG. It is also one of the first studies to investigate the role of gender in the VDG (see also Rapoport, 1988; Babcock et al., 2017). Moreover, as we previously noted, this is one of the few studies that systematically compares coordination behaviors across different cultural groups (see also Brooks et al., 2018; Jackson & Xing, 2014).

The next few sections discuss our main findings, and what they imply about the factors that drive volunteering in VDGs.

5.1. 'Universal' Volunteering Tendencies

Overall, participants were more likely to volunteer when the returns to doing so were higher, in line with the predictions of the Nash equilibrium and the results of previous studies (e.g., Murnighan et al., 1993; Weesie & Franzen, 1998). This implies that, by and large, decisions to volunteer are not driven by inflexible (e.g., deontological) prosocial norms. Clearly, many participants were, to some extent, strategic in their decisions to volunteer. However, their likelihood of volunteering consistently exceeded the predictions of the Nash equilibrium, leading to inefficiently high levels of self-sacrifice among players (i.e., the frequency of redundant, and therefore needless, volunteering exceeded the rate required to maximize expected payoffs). Thus it seems people would prefer to volunteer and assure (or increase the chance) that they receive the benefit associated with volunteering rather than relying on the other players to do so. The fact that over-volunteering was not related to culture is particularly interesting, and

suggests that deviations from economically rational levels of volunteering may be driven by 'universal' human tendencies rather than culture-specific norms.

There are a number of reasons why people might volunteer too frequently. One possibility is a premium for eliminating payoff uncertainty (Gneezy et al., 2006; Newman & Mochon, 2012; Simonsohn, 2009; Tversky & Kahneman, 1986) and ambiguity (Borghans et al., 2009; Ellsberg, 1961): A player who volunteers in the standard VDG knows exactly what he/she will receive, regardless of what others decide; volunteering thus guarantees him/her a specific payoff. Moreover, by volunteering, he/she guarantees that the other player(s) will be spared the lowest possible payoff; volunteering thus reduces the range of possible payoffs that others can receive. In sum, volunteering in the standard VDG eliminates much of the uncertainty and ambiguity surrounding future payoffs (both for self and for others), and this additional "reason" could produce excessive volunteering. However, this first possibility is ruled out by the fact that volunteering rates exceeded the Nash predictions even when the returns to volunteering were uncertain, as we saw with the three risky VDGs. In these risky VDGs, volunteering neither guarantees a specific payoff to the self, nor eliminates the possibility of receiving the lowest payoff. Therefore, aversion to uncertainty and ambiguity should only lead to excessive volunteering in the standard (sure) VDGs, contrary to what we found.

A second, and somewhat related, possibility is that players are risk averse, and therefore prefer to reduce the uncertainty of receiving a higher payoff (even if they cannot eliminate it). This account could predict excessive volunteering in both the standard and risky variants of the VDG, to the extent that participants are risk averse. However, this account also implies that participants' volunteering rates should be correlated with their risk preferences. As it turns out, our Indian participants were also presented (as part of an unrelated study, which always came after the six VDGs) with four hypothetical choices between sure monetary losses (100% chance of losing x) and uncertain monetary losses of identical expected value (50% chance of losing $2x$). We could therefore compare how frequently they preferred the sure option in each choice pair (an indicator of their aversion to risk) with their volunteering rates in the VDGs. Contrary to a risk-aversion account of excessive volunteering, we found that the proportion of sure options chosen by participants was *negatively* correlated with their overall volunteering rate (r = -.21, p = .038), as well as their likelihood of volunteering in sure VDGs (r = -.18, p = .067) and risky VDGs (r = -.18, p = .072). This suggests that the decision to volunteer is not (positively) driven by an aversion to (monetary) risk.

A third possibility is that people are mainly motivated to help others (not just themselves). This other-regarding utility (Charness & Rabin, 2002) would then make them excessively willing to incur the cost of volunteering (relative to the Nash prediction), as doing so increases their fellow players' expected payoffs. However, this account predicts that the amount of excessive volunteering should increase with the number of players (since the number of others who stand to benefit from volunteering also increases), which is not what we found. A further challenge to this account is Kim and Murnighan's (1997) finding that reported willingness to (hypothetically) volunteer is directionally lower when the whole group (as opposed to just the person who volunteers) stands to benefit. It therefore seems unlikely that other-regarding utility was the main driver of excessive volunteering in our studies.

A fourth possibility is that people might derive personal benefits (e.g., feelings of pride) from volunteering, beyond the explicit monetary payoffs offered in the game, due to internalized social norm(s). This would explain why they volunteered in "excess" of the Nash predictions based purely on the stated payoffs in the game. However, this account predicts that individuals from cultures with stronger volunteering norms (e.g., Bali) should be more likely to volunteer in the VDG, yet this is not what we found.

A fifth possibility is that people derive utility from the act of sacrificing themselves (by incurring a cost) to benefit others, even when doing so is inefficient (Olivola, 2010). Recent studies have shown that people will contribute more to a prosocial cause when doing so is painful and/or effortful, even when the pain and effort are endured privately (Olivola & Shafir, 2013). Of course, incurring a monetary cost might not be viewed in the same way as enduring pain or exerting effort, so this account requires further testing. Nonetheless, it is worth considering.

A final possibility is that people are overly pessimistic about the likelihood that others will volunteer, and thus compensate by increasing their own volunteering rates. Testing this account will require eliciting participants' beliefs concerning the likelihood that other players will volunteer in each type of VDG, and comparing these with the predictions of the Nash equilibrium, which would be an interesting avenue for future research[9]. Thus, future studies of VDGs should, in addition to measuring decisions, examine perceptions and beliefs.

[9] Weesie and Franzen (1998) did ask their participants "to guess how many of their coplayers would choose [to volunteer]." Unfortunately, they did not report any results concerning these guesses.

Beyond the two general tendencies discussed above (i.e., sensitivity to payoffs and inefficiently high volunteering rates), decisions to volunteer in certain types of VDGs were also influenced by participants' culture, gender, and religiosity.

5.2. Culture and Volunteering

We found that the overall level of volunteering did not greatly differ between most cultural groups and that participants in every location were quite sensitive to the expected payoffs in these VDGs (i.e., the size of the benefit associated with volunteering) in a way that corresponded to the game-theoretic predictions (derived from the mixed Nash equilibrium) for these games. That is, for the average participant in all five cultural groups, decisions to volunteer were noticeably strategic, and (therefore) did not follow inflexible prosocial norms. Although Balinese participants were less sensitive to the payoff variable (relative to the other cultural groups), they were certainly not indifferent to it. At the same time, for all locations, the overall level of volunteering considerably exceeded these normative (i.e., economically rational) benchmarks. As for the lack of (a robust) overall difference between cultural groups, we had expected that our Balinese participants would volunteer the most given the strong (and explicit) volunteering norms that characterize Balinese society (Veszteg & Narhetali, 2010). Yet, of the five groups in our sample, they were the *least* likely to do so, overall. These findings have a number of interesting implications. First, they suggest that the decision to volunteer is a highly context specific one, rather than the result of a domain-general social 'reflex' (c.f., Rand et al., 2014). Indeed, the fact that the influences of important cultural volunteering norms disappear when decision-makers are placed in a novel volunteering context (the VDG) seems counter to the very notion of a 'reflex.' Second, they demonstrate that the prosocial norms acquired in one's cultural environment do not necessarily carry-over to new contexts. Rather, it seems that people leave many of their culture-specific prosocial norms "at the door" when participating in an anonymous VDG experiment. Consequently, attempts to artificially produce prosocial norm spillovers in a purely lab-based setting (e.g., Peysakhovich & Rand, 2015) cannot tell us much about the extent to which cultural and societal norms are internalized by individuals in the real world (Galizzi & Navarro-Martinez, 2019). Finally, our results suggest that many social and cultural incentives that sustain volunteering (Chen et al., 2013), such as favorable public recognition and associated feelings of pride, are not fully internalized, and are therefore "fragile" in the sense that they require continuous usage and perhaps lack of anonymity, in order to remain effective. In the absence of explicit social structures and reputational concerns that prevent deviations from societal

norms, individuals from highly cooperative cultures (e.g., Bali) are no more prosocial than participants from relatively individualistic Western cultures[10] (e.g., England).

While overall volunteering rates were fairly similar across locations, we also found that culture did interact with the (un)certainty of the VDG game and its specific parameters to influence volunteering decisions. In particular, Indian participants volunteered much more frequently in the risky VDG games than the sure ones. However, this tendency is unrelated to risk preferences as we found almost no correlation between the proportion of sure options chosen by Indian participants in a risky choice task (described above) and their tendency to volunteer more frequently in risky games as opposed to sure games: $r = .026$. In addition, we found that Balinese participants were less reactive to the size of the benefit associated with volunteering than the other cultural groups.

5.3. Gender and Volunteering

To the best of our knowledge, only two other papers have compared men and women's decisions in the VDG (Rapoport, 1988; Babcock et al., 2017). Rapoport (1988) examined several variants of the VDG but found no significant gender differences in volunteering rates. However, his sample sizes were too small to detect even large differences in volunteering rates[11]. Babcock et al. (2017) used a dynamic variant of the VDG in which players had a limited time to make their volunteering decisions and only one person (the first one to contribute) could volunteer. They found that women were twice as likely to volunteer as men, except when all players in the game were known to be of the same gender (in which case men and women were equally likely to volunteer). In our study, we found that men were less inclined to volunteer than women when the benefits of volunteering were certain (i.e., in the sure VDGs), but this gender difference disappeared when volunteering did not guarantee a higher payoff for all players (i.e., in the risky VDGs) (see Figure 3). Taken at face value, the pattern of results presented in Figure 3 suggests that women are indifferent to the sure vs. risky nature of the VDG, whereas men are less motivated to volunteer in the sure payoff VDGs (i.e., the pattern is mainly driven by men choosing to volunteer less in sure VDGs).

An alternative possibility is that two separate gender effects combine to produce this pattern. For example, it may be that, compared to men, women are more willing to volunteer (Babcock et al., 2017),

[10] This is broadly analogous to Yamagishi and Yamagishi's (1994) arguments regarding cultural differences in trust between the U.S. and Japan.

[11] In one variant of the VDG, he found that 82% of women volunteered, compared to just 44% of men. However, with only 11 women and 16 men in that condition, the difference was not statistically significant.

but also more averse to uncertain payoffs (Borghans et al., 2009; Byrnes et al., 1999; Croson & Gneezy, 2009; Eckel & Grossman, 2008b; Filippin & Crosetto, 2016). Or perhaps women are more likely to volunteer overall, but their willingness to do so is more sensitive to efficacy concerns and the likelihood of increasing collective welfare (Lindenmeier & Dietrich, 2011). According to this alternative account, the greater tendency for women to volunteer overall (which we observed in the sure VDGs) is nullified by their aversion to uncertain payoffs (thereby explaining the lack of gender differences in the risky VDGs). This latter account would also help explain why women are more likely than men to contribute prosocially when doing so guarantees positive returns to the contributor (Babcock et al., 2017), but not when the returns on investment are negative (such as in most public goods games; see Croson & Gneezy, 2009). However, this second account fails to explain why the men in our study were more likely to volunteer in the risky VDGs than in the sure VDGs, whereas women were equally likely to do so in both types of VDGs.

The pattern we observe does seem to parallel prior evidence that women are more cooperative (than men) in riskless settings but no more so in risky settings (Croson & Buchan, 1999; Eckel & Grossman, 2008a). In particular, when faced with a risky opportunity to cooperate --e.g., as first movers in a trust game (Croson & Buchan, 1999) or proposers in an ultimatum game (Eckel & Grossman, 2008a)-- men and women do so to similar degrees. By contrast, when they can cooperate without risk --e.g., as second movers in a trust game (Croson & Buchan, 1999) or sole deciders in a dictator game (Eckel & Grossman, 2008a)-- women tend to be more generous than men. While these prior results seem to align with ours, there is an important difference concerning the nature of the risk involved: in the other social dilemmas studies, the risks that participants faced were "social" in nature (e.g., the risk of being betrayed in the trust game or having one's proposal rejected in the ultimatum game), whereas the risk that we added to the risky VDGs is not (it is driven by the role of a die). Thus, our results suggest that gender differences in cooperation are not only moderated by the presence of "social" risks, such as betrayal and rejection, but also by the presence of non-social risks. These findings therefore contribute to our (still limited) understanding of the role of uncertainty in social dilemmas (Van Dijk et al., 2004).

Clearly, more research is needed to elucidate the relationship between gender and decisions to contribute in the Volunteer Dilemma. All we can say, for now, is that women are more likely (than men) to volunteer when volunteering guarantees the higher (individual and collective) payoff, equally likely to do so when volunteering does not guarantee it, but never less likely to volunteer (at least in the contexts that have been examined so far).

5.4. Religiosity and Volunteering

We found that religious participants were more inclined to volunteer than non-religious ones. Thus being religious seems to increase the likelihood of volunteering, even in an anonymous, abstract experimental game (i.e., even in the absence of external pressures to do so). While this finding may seem intuitive, it actually runs counter to most experimental studies exploring the relationship between religiosity and prosocial behavior (for reviews, see Galen, 2012; Hoffmann, 2013; Sablosky, 2014). The vast majority of these experiments (including those utilizing social dilemma games) have found no significant relationship between religiosity and prosocial behavior (Ahmed & Salas, 2009, 2011; Akay et al., 2015; Anderson & Mellor, 2009; Anderson et al., 2010; Annis, 1975, 1976; Batson et al., 1993; Chuah et al., 2014; Eckel & Grossman, 2004; Grossman & Parrett, 2011; Hunsberger & Platonow, 1987; Orbell et al., 1992; Paciotti et al., 2011; Tan, 2006). There has been very little experimental evidence significantly linking religiosity and prosocial choices in social dilemma games (Ahmed, 2009; Ben-Ner et al., 2004; Brañas-Garza et al., 2014; Sosis & Ruffle, 2003), and these studies either did not directly ask participants if they were religious (Ben-Ner et al., 2004; Brañas-Garza et al., 2014) or they confounded religious prosociality with favoritism toward members of the same religious community (Ahmed, 2009; Sosis & Ruffle, 2003 – see Galen, 2012). Our study thus seems to be one of the first social dilemma experiments to clearly show that self-reported religiosity is associated with greater prosocial behavior. To the best of our knowledge, it is the first study to demonstrate a link between religiosity and decisions in the Volunteer's Dilemma.

At the same time, being religious did not significantly increase the likelihood of being an unconditional volunteer (Table 2), nor did it significantly mitigate sensitivity to the various features of the VDGs (Table 3). In particular, although participants were very sensitive to the size of the payoff to volunteering (the odds of volunteering increased by more than 170% in high-payoff VDGs), religious participants were not reliably less sensitive to this parameter (being religious reduced the effect of high-payoffs by less than 23%, and this difference was not significant). Thus, contrary to what we might predict (given that volunteering is a very strong norm, even a sacred duty, in many religions), being religious does not make people indifferent to economic features of the VDG, nor more likely to volunteer unconditionally.

Since we collected data from participants of many different religions, we can also look at whether the effect of religiosity depends on the particular religion that one identifies with. Figure 4

presents the mean volunteering rates for the four most common categories of religious affiliation in our participant sample, sub-divided by religiosity. This figure reveals three features about the relationship between religion and behavior in the VDG: first, volunteering rates were similar across the three most commonly reported religions in our sample (Christianity, Hinduism, and Islam: $F(2, 317) < .52$); second, being affiliated with one of these religions (as opposed to having no religious affiliation) did not predict greater volunteering ($t(400) < .34$); third, religiosity was associated with higher volunteering rates for all three religions –specifically, a 2×3 ANOVA (with religiosity and religion as the independent factors) revealed a main effect of religiosity ($F(1, 309) = 5.98$, $p = .015$), but no main effect of religion ($F(2, 309) < .61$), and no interaction between these variables ($F(2, 309) = 1.42$, $p > .24$). In other words, conditional on being affiliated with a religion, religiosity positively predicts volunteering; however, people not affiliated with any religion are no less likely to volunteer than those who do identify with a specific religion. In sum, religiosity, but not religious affiliation, increases prosocial behavior in the VDG.

This naturally raises the question of why religiosity motivates volunteering in the VDG. One simple and intuitive explanation is that many religions (including those most heavily represented in our samples) prescribe the kind of prosocial behavior measured in the VDG –namely self-sacrifice for the collective welfare. However, this account predicts that participants not affiliated with any religion should be less likely to volunteer than those who do identify with a religion that prescribes volunteering, which is *not* what we found (see Figure 4). It also predicts that being religious should increase unconditional volunteering and decrease sensitivity to economic considerations, but we did not find this either. Alternatively, to the extent that religiosity is associated with risk-aversion, this would also favor volunteering in the VDG. Support for this alternative account comes from the sociology of religion literature, which has repeatedly documented a link between religiosity and risk-aversion (e.g., Freese, 2004; Liu, 2010; Miller, 2000; Miller & Hoffmann, 1995). In fact, these studies have more specifically found that risk-aversion is related to religiosity, but not to religious affiliation (Liu, 2010), and is a stronger predictor of religiosity among Christians and Muslims than among Hindus and Buddhists (Miller, 2000). Given our findings that religiosity, but not religious affiliation, predicts VDG decisions, and that this religiosity 'effect' seems to be (directionally) stronger for Christians and Muslims than it is for Hindus (Figure 4), the risk-aversion account seems compelling. This suggests that religious individuals volunteered more frequently because they are more risk-averse, and not simply because they are more prosocially motivated. On the other hand, as we previously noted, the level of risk aversion in

our Indian participants was *negatively* related to their volunteering rates. These mixed findings call for more research into the potential links between religiosity, risk preferences, and prosocial behaviors. Future studies testing the relationship between religiosity and prosocial behavior should also measure (and control for) individual risk preferences and risk attitudes. Conversely, those examining the role of risk preferences in social dilemmas should also measure (and control for) religiosity.

Taken together, our results paint a nuanced picture of the impact of religion on volunteering in a controlled setting. Merely being affiliated with a religion (versus no religion) does not increase volunteering. Being religious does increase the overall likelihood of volunteering, but it doesn't reduce sensitivity to economic considerations, nor (therefore) does it lead to unconditional volunteering.

5.5. Addressing Methodological Concerns

Cross-cultural studies often come with a number of methodological concerns, and this is no less true when they involve having participants partake in unusual experimental economic games.

One important concern is that the samples collected across cultural locations may vary in terms of more than just their cultural background. After all, countries have different average levels of wealth, education, and other socioeconomic variables. Consequently, these socioeconomic variables are often confounded with the cultural variables of interest. Even cross-cultural studies that purely sample university students but fail to control for their academic fields of study[12] only partially reduce the influence of socioeconomic variables and potentially introduce additional confounds: the particular field of study that a person selects into is likely to be correlated with a host of non-cultural factors, such as socioeconomic status, cognitive ability, personality traits, etc. To address these issues, we only recruited university economics[13] students in each cultural location. All of our participants were thus drawn from a fairly narrow range of ages (young adults between the ages of 17 and 33) and education levels (undergraduate or first-year Master's students). The fact that they were attending university also indicates that most of them likely came from medium-to-high socioeconomic backgrounds. Moreover, they had all selected into economics as a field of study and completed extensive coursework in economics. Having the participants in all five cultural locations share these characteristics strongly

[12] As a striking case in point, the first author was once asked to review a manuscript describing a "cross-cultural study" that had recruited engineering students in one country and compared their responses to a sample of humanities students in another country.

[13] Future cross-cultural VDG studies might consider recruiting participants from a different field of study (e.g., sociology) to see whether the results we obtained extend to individuals who selected into, and trained in, another discipline. Regardless of the field, these studies should make sure all of their participants are from that same field, in order to tease apart the potential effects of culture and academic orientation.

mitigates the influence of non-cultural factors, thereby helping address a major set of concerns typically associated with cross-cultural studies. Furthermore, by having each participant respond to the six VDG variants, we also controlled for all individual fixed effects, so the interactions we observed between certain cultures and features of the VDG cannot be attributed to irregularities in the assignment of participants to conditions (since every person was assigned to every condition).

A second potential concern is that participants may have failed to understand, or even pay attention to, the rules of the VDG, which could have led them to respond randomly or default into volunteering. The first possibility (random responding) is invalidated by fact that mean volunteering rates almost always exceeded chance (50%). The second possibility (volunteering as a default, without attending to payoffs) is refuted by several features of the data, including (i) the fact that volunteering rates varied substantially within countries, (ii) the fact that participants' decisions to volunteer were clearly sensitive to the (expected) payoffs associated with volunteering, and (iii) the fact that, as (intuitively) expected, religious participants were more likely to volunteer than less religious ones (from the same religion). This last finding (the main effect of religiosity on volunteering) also counters concerns that the participants in our study may have (incorrectly) assumed that they were supposed to completely ignore cultural and social norms when playing the VDG. In sum, our failure to observe a (robust) main effect of culture in the VDG cannot be attributed to inattention or confusion on the part of the participants.

6. Conclusions and Implications

This paper simultaneously examined the influence of several factors that are of interest to economists and game-theorists (payoff size and uncertainty), psychologists (gender and religiosity), and sociologists (cultural group and religious affiliation), on decisions in the volunteer's dilemma game (VDG). Interestingly, we found main effects of individual characteristics (gender and religiosity), but (mostly) moderating effects of socio-cultural factors (religious affiliation and cultural group), on the likelihood of volunteering in the VDG. Our results also show that, regardless of culture, gender, or religiosity, people are generally sensitive to normatively relevant features of the VDG environment (i.e., the size of the benefit associated with volunteering), and adjust their likelihood of volunteering accordingly. At the same time, we found that some cultural groups react differently to the riskiness or expected value of volunteering. We also found that men and women react differently to the riskiness of volunteering. Finally, we found that religiosity (but not religious affiliation) increases volunteering.

These results have a number of theoretical implications. With regard to economic models of rational decision making, they suggest that social and cultural capital (e.g., religiosity and culture) can play important roles in shaping people's decisions in social dilemmas. With regard to social psychology, they show that the tendency for diffusion of responsibility to occur (Darley & Latané, 1968; Latané & Darley, 1968, 1970; Latané & Rodin, 1969) depends on the interplay of culture, individual characteristics, and the nature (i.e., size and uncertainty) of the benefits associated with helping. With regard to evolutionary theories of cooperation, we find, on one hand, that the overall tendency to volunteer in VDGs and the proportion of unconditional volunteers vary surprisingly little across cultures (thereby lending support to evolutionary accounts), and on the other hand, that cultures differ in how they respond to the expected benefits of volunteering and whether these benefits are sure or risky. Moreover, as we previously explained (in the Introduction and Discussion sections), our findings, concerning the independent and interactive effects of VDG parameters and individual characteristics, can help elucidate which underlying factors could be driving people's decisions to volunteer in VDGs.

Finally, our findings have implications for promoting volunteering within organizations and in society more broadly. For example, our VDG results suggest that the tendency for individuals to volunteer in their communities (e.g., Penner, 2002; Penner et al., 2005), or for employees' to engage in organizational citizenship behaviors (e.g., Cohen et al., 2014; Organ, 1988; Smith et al., 1983), may depend not only on the expected value of doing so, but also on the (un)certainty of the benefits associated with these prosocial behaviors.

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Table 1 – The six different Volunteer Dilemma Games (VDGs) used in the study

Game type	Sure			Risky		
Game label	■	♥	♠	●	♦	♣
Nash prediction (volunteering rate)	0.75	0.33	0.29	0.75	0.33	0.29
Number of players in the group	2	2	3	2	2	3
Cost of volunteering (points)	2	2	2	2	2	2
Benefit of volunteering (points)	8	3	4	32	12	16
3-Players dummy coding	0	0	1	0	0	1
High-Payoffs dummy coding	1	0	0	1	0	0
Risky-Payoffs dummy coding	0	0	0	1	1	1

Note: Each sure-gain VDG had a corresponding risky-gain VDG, with the same expected value. The prizes in the risky-gain VDGs are four-times as large as those in the sure-gain VDGs because volunteering in the former only increased the chances of winning the additional prize by 1/4 (i.e., from 1/4 to 1/2), whereas volunteering in the latter increased the chances of winning the additional prize by 1 (i.e., from 0 to 1).

Table 2 – Regression results for the overall volunteering rate and unconditional volunteering likelihood

	Overall Volunteering Rate (OLS regression)		**Unconditional Volunteering (Logit regression)**	
	Model 1 (N = 554)	Model 2 (N = 445)	Model 1 (N = 554)	Model 2 (N = 445)
Gender				
Male	- 4.2% ‡	- 5.6% *	- 6.6%	- 19.0%
Religious				
Yes	.	+ 7.0% **	.	+ 20.9%
Culture				
Bali	- 1.3%	- 4.5%	- 40.8% ‡	- 46.6% *
India	- 2.1%	- 5.5%	- 27.8%	- 33.8%
Israel	+ 2.1%	.	+ 29.9%	.
Java	- 5.5%	- 8.1% *	- 33.9%	- 40.6% ‡

Note. The first two columns present the (standard ordinary least-squares) regression results for the overall volunteering rate, with coefficient values representing changes in the proportion of volunteer choices (out of the six games). The last two columns present the logistic regression results for unconditional (consistent) volunteering, with coefficient values representing the change in odds of being an unconditional volunteer. Results are presented for two different sets of predictors: Model 1 includes Israeli participants and Israel as a predictor, but excludes religiosity; Model 2 includes religiosity as a predictor, but excludes Israeli participants. All predictors are dummy-coded variables being compared to a baseline group: Model 1 baseline is female and in England; Model 2 baseline is female, non-religious, and in England. ‡ p < .1, * p < .05, ** p < .01, *** p < .001

Table 3 – Logistic HLM results for volunteering likelihood

	Model 1 (N = 554)	Model 2 (N = 445)
Main Effects of Participant Characteristics (♥ Game)		
MALE	- 41.3% **	- 47.1% **
RELIGIOUS	.	+ 82.5% **
BALI	+ 29.2%	+ 2.7%
INDIA	- 42.1% *	- 54.1% **
ISRAEL	+ 16.1%	.
JAVA	- 29.8%	- 40.4% ‡
Main Effect of 3-Players	- 21.4%	- 23.4%
Interactions:		
MALE × 3-Players	+ 9.8%	+ 24.5%
RELIGIOUS × 3-Players	.	- 15.9%
BALI × 3-Players	- 7.0%	0%
INDIA × 3-Players	- 19.1%	0%
ISRAEL × 3-Players	+ 5.4%	.
JAVA × 3-Players	+ 48.5%	+ 54.4%
Main Effect of High-Payoffs	+ 172.4% ***	+ 171.1% ***
Interactions:		
MALE × High-Payoffs	+ 9.4%	+ 25.6%
RELIGIOUS × High-Payoffs	.	- 22.2%
BALI × High-Payoffs	- 55.2% *	- 51.2% *
INDIA × High-Payoffs	+ 45.4%	+ 54.3%
ISRAEL × High-Payoffs	- 21.9%	.
JAVA × High-Payoffs	- 8.1%	- 4.3%
Main Effect of Risky-Payoffs	- 22.8%	- 11.9%
Interactions:		
MALE × Risky-Payoffs	+ 66.1% **	+ 48.0% *
RELIGIOUS × Risky-Payoffs	.	- 18.0%
BALI × Risky-Payoffs	- 21.3%	- 19.1%
INDIA × Risky-Payoffs	+ 153.1% ***	+ 152.5% ***
ISRAEL × Risky-Payoffs	+ 4.6%	.
JAVA × Risky-Payoffs	- 13.7%	- 12.5%

Note. Coefficient values represent the change in odds of volunteering. Model 1 includes Israeli participants and Israel as a predictor, but excludes religiosity; Model 2 includes religiosity as a predictor, but excludes Israeli participants. The first six rows of coefficient values present the main effects of the level 2 (between-participant) variables (i.e., gender, religiosity, and cultural group; all dummy-coded) in the ♥ game (i.e., two players and certain low returns to volunteering), as compared to a baseline group: Model 1 baseline is female and in England; Model 2 baseline is female, non-religious, and in England. The remaining rows of coefficient values present the main effect for each level 1 (within-participant) variable, followed by its interactions with the level 2 variables. ‡ $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$

Figure 1

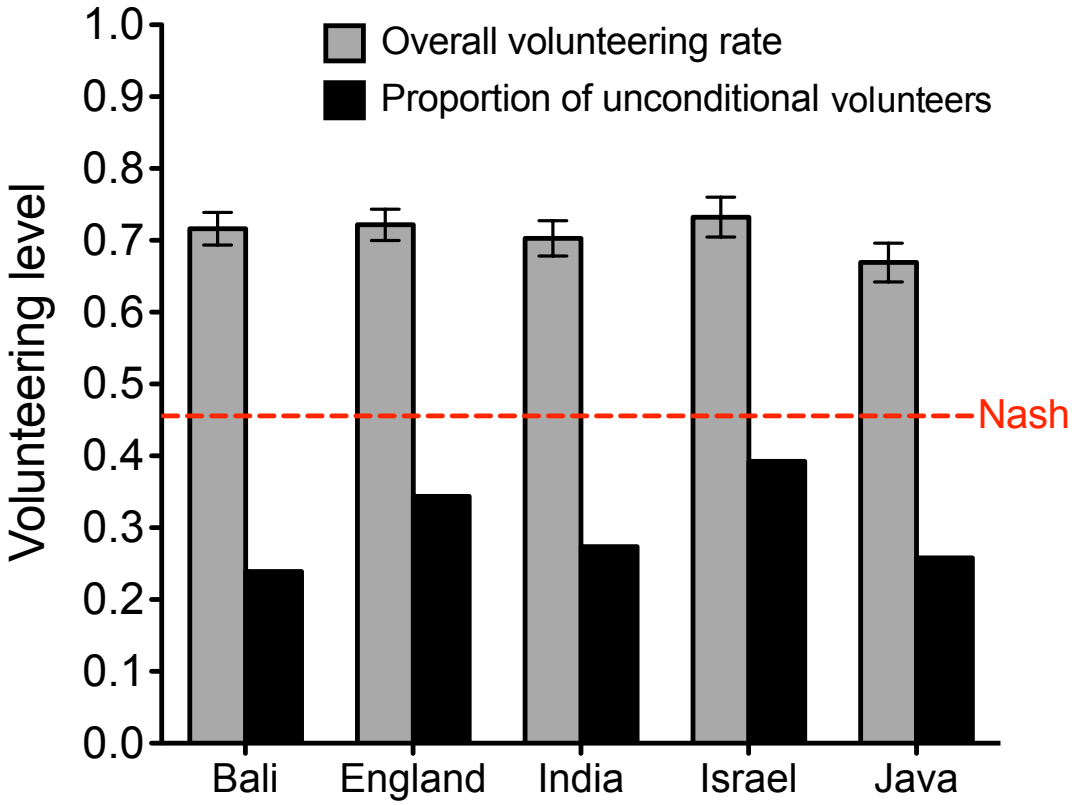

Fig. 1.

Mean volunteering rates (grey bars) and the proportion of unconditional volunteers (black bars) in each cultural group. Error bars represent standard errors. The red line represents the overall volunteering rate predicted by the Nash equilibria averaged across the six games (M_{Nash} = 46%).

Figure 2

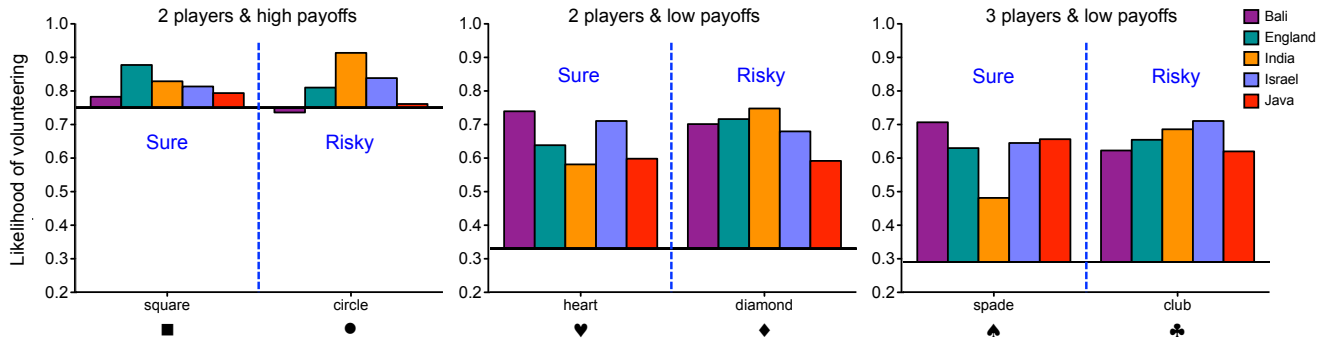

Fig. 2.

Volunteering rates as a function of cultural group and game type. The elevated horizontal black lines (above the x-axis) in each graph represent the volunteering rate predicted by the mixed Nash equilibrium (for that particular pair of games). Volunteering rates are presented as absolute levels but plotted relative to the mixed Nash equilibrium.

Figure 3

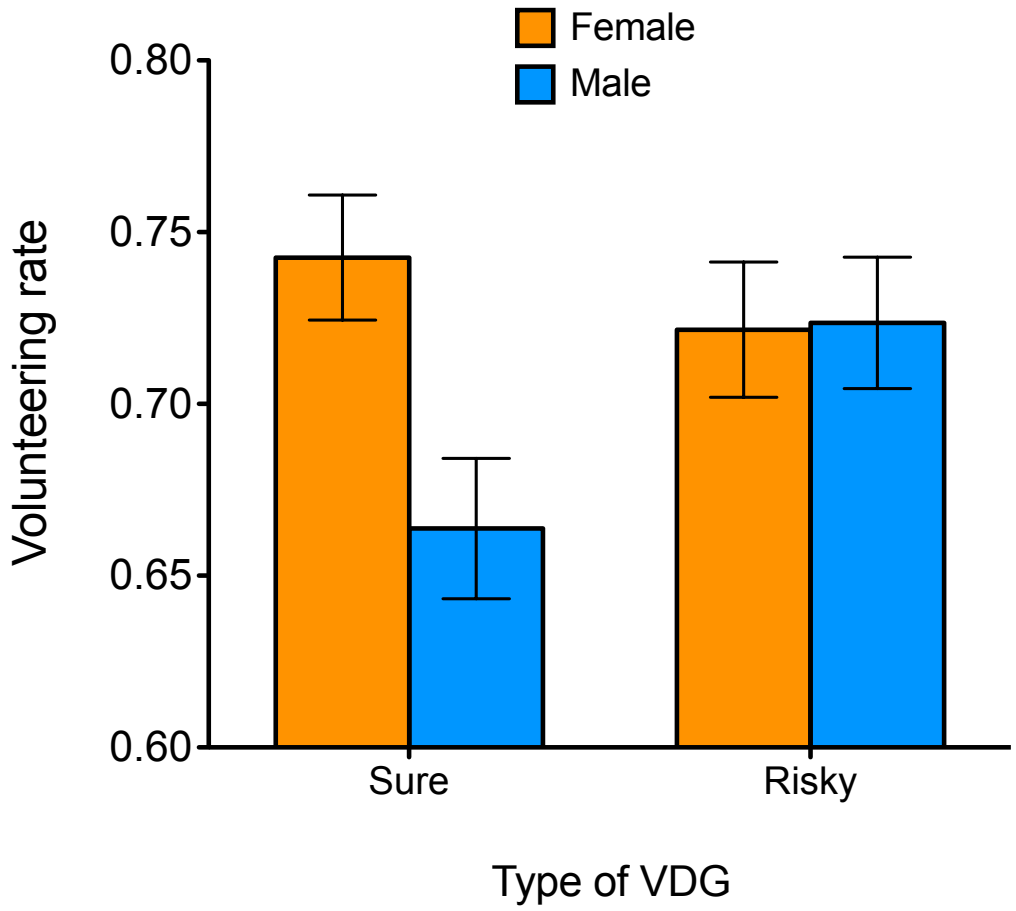

Fig. 3.

Mean volunteering rates as a function of gender and riskiness of volunteering. Error bars represent standard errors.

Figure 4

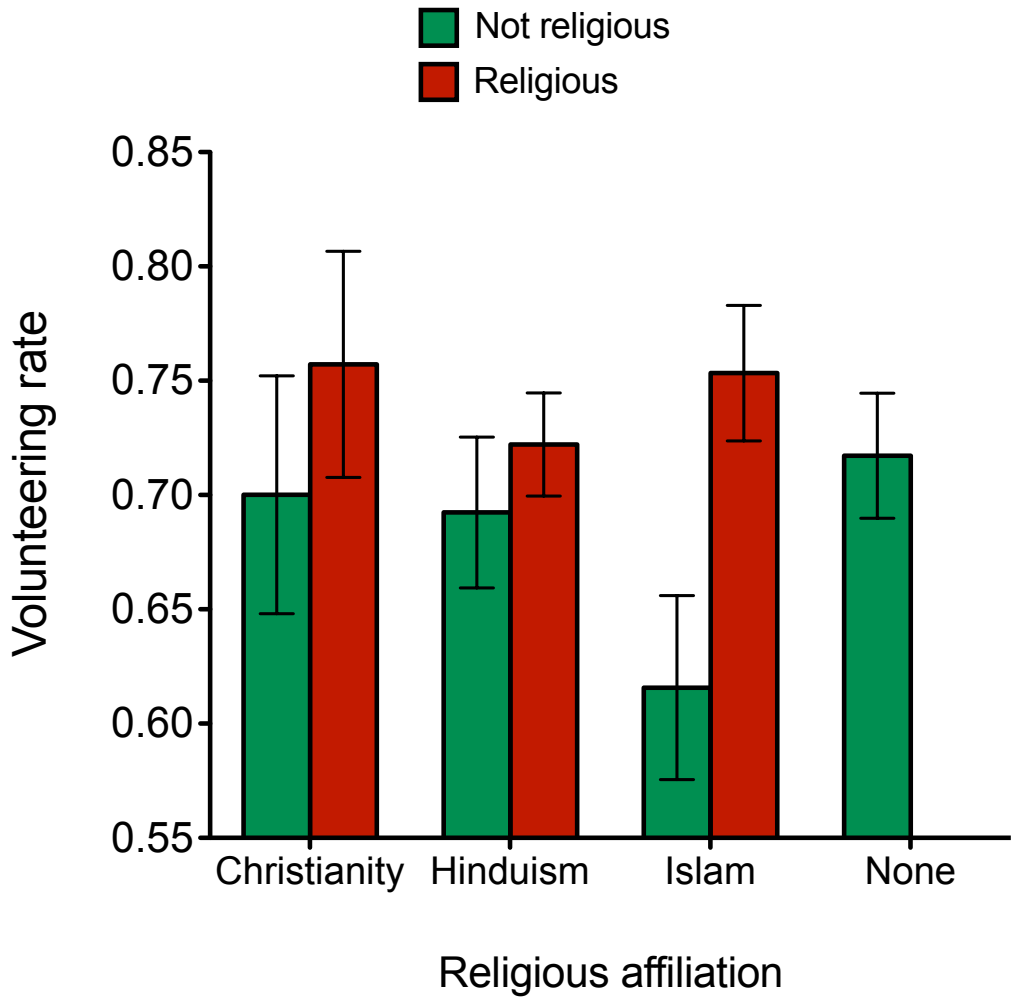

Fig. 4.

Mean volunteering rates as a function of religious affiliation and religiosity. Error bars represent standard errors.

Appendix A – The mixed Nash equilibrium for the Volunteer Dilemma Game (VDG)

The Nash equilibrium predicts that players volunteer with a probability *P*, where the value of *P* is such that, if all conform to that likelihood of volunteering then no one would prefer to deviate (i.e., no player would choose to increase or decrease their likelihood of volunteering). The Nash equilibrium is solved using the following equation:

$$(B-C)(1-(1-P)^{N-1})+(B-C)(1-P)^{N-1}=B(1-(1-P)^{N-1})$$

And the solution (i.e., the value of *P*) is:

$$P=1-\left(\frac{C}{B}\right)^{\frac{1}{N-1}}$$

where *C* is the cost of volunteering, *B* is the benefit, and *N* the number of players in the game. It is easy to see that *P* decreases as the cost (*C*) increases, increases as the benefit (*B*) increases, and also decreases as the number of players (*N*) increases. This solution relies on players maximizing expected value (or, equivalently, assumes risk neutral utility functions) and hence does not discriminate between probabilistic/risky and sure versions of the VDG that are equated in terms of their expected values (of volunteering or not volunteering).

Appendix B – Volunteer's Dilemma Game Instructions (English version)

In this experiment you will be presented with six problems, and have to decide how to act in each. At the end of the experiment one of these six problems will be chosen at random by the roll of a die. You will then be randomly matched with one or two other players to form your "group" and you will be paid in accordance with your decision and the decision(s) of other member(s) of your group on the randomly chosen problem.

Your earnings in this experiment will be in points, which will later be converted into [local currency]. You will begin each problem with a starting endowment of **4** points. The value of every point is [conversion value for that location].

In three of the problems you are entitled to receive an additional **n** points. If, however, you or any other member of your group decides to invest **2** points from their own endowment then each member of your group will instead receive an additional **2×n** points (rather than only **n** points). It suffices that just one person in your group invests **2** endowment points for all members in the group to receive the **2×n** points, and additional investments beyond the first one will not increase points any further. However, anyone who decides to invest must pay the **2** endowment points (i.e., their endowment becomes **2** points rather than **4** points), regardless of what the other member(s) of the group decide. If no one in your group invests **2** endowment points then you all receive only **n** additional points (rather than **2×n** points).

In the other three problems you will choose two numbers between 1 and 4, and indicate which of these two numbers is your first choice and which is your second choice. A random device will be used to generate a number between 1 and 4. If the number generated by the device equals your first choice then you receive **m** additional points. If, however, you or any other member of your group decides to invest **2** points from their own endowment then your second choice number also participates in the lottery. In that case, you will receive **m** additional points if the number generated by the random device equals either of the two numbers you chose. In other words, every member of the group will have their chances of winning the lottery doubled if any of them invests **2** endowment points. It suffices that just one person in your group invests **2** endowment points for all members in the group to have their chances of winning the lottery doubled in this way. Additional investments beyond the first one will not further increase chances of winning the lottery. However, anyone who decides to invest must pay the **2** endowment points (i.e., their endowment becomes **2** points rather than **4** points), regardless of what the other member(s) of the group decide. If no one in your group invests **2** endowment points then you will receive the **m** additional points only if the randomly generated number is equal to your first number, but not if it is equal to your second number (or to the remaining two numbers that you did not choose). Only your two selected numbers can determine whether you receive additional points. The numbers chosen by the other member(s) of your group do not affect you. Only their decision to invest (or not) can impact whether you receive additional points, but not their choice of numbers.

Your decisions in all six problems must be made in private and anonymously (i.e., without knowing the decisions of the other member(s) of your group). None of your choices or your final payment will ever be made public.

Please note that only one of these problems will be randomly selected to determine final payments, and you will be paid (in [local currency]) the value of your remaining endowment points and additional points you may have received for that randomly chosen problem only. All starting endowments, investments made, and additional points earned in the other, non-chosen problems will not contribute to your final payment.

In the following page you will find the six problems described in detail.

Appendix B – Volunteer's Dilemma Game Instructions (English version)

(♥) Your group consists of **two** players. Each player's starting endowment is **4** points.
If neither of you invests **2** endowment points then you each get an additional **3** points.
If either one or both of you invests **2** endowment points then you each get an additional **6** points.

Do you invest **2** points?	Yes	No	(circle one option)

(♦) Your group consists of **two** players. Each player's starting endowment is **4** points.

Please choose two different numbers between 1 and 4:
- ⇨ Put a circle around your first choice number.
- ⇨ Draw an "X" below your second choice number.

1	2	3	4

If none of you invests **2** endowment points then you get an additional **12** points only if your first choice number matches the randomly generated number.
If either one or both of you invest **2** endowment points then you get an additional **12** points if either your first or second choice number matches the randomly generated number.

Do you invest **2** points?	Yes	No	(circle one option)

(■) Your group consists of **two** players. Each player's starting endowment is **4** points.
If neither of you invests **2** endowment points then you each get an additional **8** points.
If either one or both of you invests **2** endowment points then you each get an additional **16** points.

Do you invest **2** points?	Yes	No	(circle one option)

(●) Your group consists of **two** players. Each player's starting endowment is **4** points.

Please choose two different numbers between 1 and 4:
- ⇨ Put a circle around your first choice number.
- ⇨ Draw an "X" below your second choice number.

1	2	3	4

If none of you invests **2** endowment points then you get an additional **32** points only if your first choice number matches the randomly generated number.
If either one or both of you invest **2** endowment points then you get an additional **32** points if either your first or second choice number matches the randomly generated number.

Do you invest **2** points?	Yes	No	(circle one option)

(♠) Your group consists of **three** players. Each player's starting endowment is **4** points.
If none of you invests **2** endowment points then you each get an additional **4** points.
If one, two, or all of you invest **2** endowment points then you each get an additional **8** points.

Do you invest **2** points?	Yes	No	(circle one option)

(♣) Your group consists of **three** players. Each player's starting endowment is **4** points.

Please choose two different numbers between 1 and 4:
- ⇨ Put a circle around your first choice number.
- ⇨ Draw an "X" below your second choice number.

1	2	3	4

If none of you invests **2** endowment points then you get an additional **16** points only if your first choice number matches the randomly generated number.
If one, two, or all of you invest **2** endowment points then you get an additional **16** points if either your first or second choice number matches the randomly generated number.

Do you invest **2** points?	Yes	No	(circle one option)

Appendix C – HLM model equations

Model 1

Level-1 Model

$$\mathrm{P}(Volunteering_{ti} = 1 \mid \pi_i) = \phi_{ti}$$
$$\log[\phi_{ti} / (1 - \phi_{ti})] = \eta_{ti}$$
$$\eta_{ti} = \pi_{0i} + \pi_{1i}(Three\ Players_{ti}) + \pi_{2i}(High\ Payoffs_{ti}) + \pi_{3i}(Risky_{ti})$$

Level-2 Model

$$\pi_{0i} = \beta_{00} + \beta_{01}(Male_i) + \beta_{02}(Bali_i) + \beta_{03}(India_i) + \beta_{04}(Israel_i) + \beta_{05}(Java_i) + r_{0i}$$
$$\pi_{1i} = \beta_{10} + \beta_{11}(Male_i) + \beta_{12}(Bali_i) + \beta_{13}(India_i) + \beta_{14}(Israel_i) + \beta_{15}(Java_i)$$
$$\pi_{2i} = \beta_{20} + \beta_{21}(Male_i) + \beta_{22}(Bali_i) + \beta_{23}(India_i) + \beta_{24}(Israel_i) + \beta_{25}(Java_i)$$
$$\pi_{3i} = \beta_{30} + \beta_{31}(Male_i) + \beta_{32}(Bali_i) + \beta_{33}(India_i) + \beta_{34}(Israel_i) + \beta_{35}(Java_i)$$

Model 2

Level-1 Model

$$\mathrm{P}(Volunteering_{ti} = 1 \mid \pi_i) = \phi_{ti}$$
$$\log[\phi_{ti} / (1 - \phi_{ti})] = \eta_{ti}$$
$$\eta_{ti} = \pi_{0i} + \pi_{1i}(Three\ Players_{ti}) + \pi_{2i}(High\ Payoffs_{ti}) + \pi_{3i}(Risky_{ti})$$

Level-2 Model

$$\pi_{0i} = \beta_{00} + \beta_{01}(Male_i) + \beta_{02}(Religious_i) + \beta_{03}(Bali_i) + \beta_{04}(India_i) + \beta_{05}(Java_i) + r_{0i}$$
$$\pi_{1i} = \beta_{10} + \beta_{11}(Male_i) + \beta_{12}(Religious_i) + \beta_{13}(Bali_i) + \beta_{14}(India_i) + \beta_{15}(Java_i)$$
$$\pi_{2i} = \beta_{20} + \beta_{21}(Male_i) + \beta_{22}(Religious_i) + \beta_{23}(Bali_i) + \beta_{24}(India_i) + \beta_{25}(Java_i)$$
$$\pi_{3i} = \beta_{30} + \beta_{31}(Male_i) + \beta_{32}(Religious_i) + \beta_{33}(Bali_i) + \beta_{34}(India_i) + \beta_{35}(Java_i)$$