Altruism in the time of COVID-19: We are all in this together, but who is we?

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Abstract

Theory posits that in situations of existential threat, selfish motivations will be outweighed by altruistic ones, and cooperation will be parochial. Yet, the global character of the COVID-19 pandemic makes unclear which level of group inclusiveness individuals will privilege. In an online experiment, participants from the U.S. and Italy chose to allocate a monetary bonus to a charity active in COVID-19 relief efforts at the local, national, or international level, or to keep the bonus for themselves. We found that personal exposure to COVID-19 increased donations relative to those not exposed, even as levels of environmental exposure (numbers of cases locally) had no effect. Only one-third of individuals acted entirely selfishly. Donors predominantly benefitted the local level (state in the U.S., region in Italy); donations toward country and world levels were half as large. Social identity was a moderating factor in both countries. These results confirm and qualify existing theories.

Introduction

The unfolding COVID-19 pandemic poses the most serious existential threat to contemporary societies since WWII. This is likely to have wide-ranging consequences for patterns of cooperation and social cohesion within and between countries. Crises such as these heighten the tension between individual and collective interests, distilling the essence of a social dilemma[1]. On one hand, the stress and uncertainty of personal vulnerability make self-sacrifice more costly, particularly for those directly impacted. On the other hand, shared threat makes cooperation the mutually beneficial course of action and enhances the salience of collective interdependence. Human altruism is still a puzzle for both social sciences and evolutionary biology[2], and its study in a situation of incumbent threat is valuable because it is precisely these situations that characterized human societies for most of their evolutionary past[3].

Theories of the evolutionary origin of group cooperation that posit a link between threat from disease and intragroup and intergroup behavior have implications for altruism and cooperation. Parasite-stress theory in particular posits that greater exposure to diseases is associated with higher degree of “ingroup” favoritism and “outgroup” discrimination because of the threat that people from the outgroup will carry pathogens to which an individual is not immune[4]. An “ingroup” is defined as a collectivity whose members experience some communality of fate, culture, and heritage which is associated with a sense of shared identity and attachment[5]. Under conditions of threat from disease, group members are expected to increase preference for ingroup association and to have increased awareness of their shared fate and interdependence within the group[6]. Terror management theory[7] also suggests that as life-threatening events occur, people will experience greater attachment to their ingroup because entrenching in traditional values reduces existential anxiety in a time of crisis and awareness of mortality[8]. Empirically, activating fear of death has been found to increase generosity in experimental games[9] and contributions to ingroup charities[10].

Research has also examined the impact of exposure to life-threatening events other than diseases on propensity to cooperate, but these studies are not conclusive as to the development of heightened pro-sociality. Exposure to war has been associated with increased propensity to cooperate with one’s ingroup[11–14], both at the individual and community level. However, research examining the aftereffects of exposure to natural disasters, such as earthquakes, tsunamis, or floods, reach contradictory results. While some studies suggest that community[15,16] or country residents[17] behave more cooperatively in the short run following experience disaster, this effect may wane with time[18,19]. Other studies found null or negative effects[20,21].

The studies regarding effects of exposure to life-threatening events do not address at least two aspects that are specific to the COVID-19 pandemic. First, all these studies have investigated exposure to such events after the crisis

had ended. Although observational and anecdotal evidence suggests that individuals involved in situations of immediate shared threat tend to behave cooperatively rather than opportunistically[22], systematic empirical evidence gathered in the heat of the crisis is rare[23]. In the face of the ongoing coronavirus pandemic, some people may experience COVID-19 directly – in person or through the diagnosis of someone close to them – while others may experience it only indirectly through its impact on the community and potential risk of exposure in the environment in which they live. Although personal exposure to near-fatal health threats has been associated with engaging in prosocial behaviour[24] and the arousal of prosocial feelings[25], heightened risk to the self has also been shown to reduce cooperation with others[24]. Moreover, little is known about the relative effects of personal exposure versus environmental-level exposure.

Second, the pandemic features of COVID-19 may blur the traditional boundaries between ingroups and outgroups. While attempts by political leaders to depict COVID-19 as a "foreign virus" have been evident, when our study was conducted it was already clear that Asian countries where the virus had originated were no longer the locus of infection. Given that COVID-19 is a completely new strain of coronavirus, to which no group could have developed immunity in the past, contagion from one's own group is, in principle, as likely as contagion from an outgroup.

Existing accounts of cooperation are concordant with the theories reviewed above in suggesting a parochial character for pro-sociality[3], that is, a tendency to limit cooperation to the ingroup rather than toward outgroups[26,27]. However, in contemporary societies ingroups come at different levels of inclusiveness—small, local groups are frequently nested within larger collectives (such as villages within states within nations)[28]. Laboratory research on nested dilemma experiments provide some information on relative preference for contributing toward groups of different levels of inclusiveness. Results suggest that individuals choose more universal groups depending on relative social returns[29], the availability of social information on others' choices[30], and the consequences of one's action for other local groups[31]. Relative contributions to groups at different levels of inclusion increase when these are made more salient[29]. Research with natural groups also shows varying propensity to cooperate with global others as opposed to local others[30].

In contemporary societies, identities are often fluid and highly susceptible to being shaped by globalization[32]. It is precisely global shocks like COVID-19 that can trigger a stronger sense of "humanity as a whole"[33], where "we are only as strong as the weakest among us", as stated by UN Secretary General Gutteres[34]. The idea that humanity may be one's ingroup has both theoretical foundations and empirical support[35,36], and the hypothesis that globalization shapes an individual's tendency to cooperate at different levels of inclusion has also been demonstrated[30,37].

The goal of this paper is to gauge the extent to which people act altruistically rather than selfishly as a function of their exposure to the COVID-19 pandemic, and, more specifically, toward which group such altruism is directed. Our study consisted of two online experiments conducted in the U.S. and Italy to evaluate the extent of altruism in the form of charitable giving, and whether such altruism has a more parochial or cosmopolitan character under the global threat of COVID-19. In the context of an online survey, participants were given an unexpected monetary bonus and then asked whether they wished to donate some or all of the bonus and, if so, to which one of three charitable organizations providing aid to those affected by the COVID-19 pandemic. Any amount donated was matched by the researchers so that the contribution to the selected charity was doubled. Because of doubling, the donation decision had the basic properties of a public goods dilemma: contributed funds resulted in increased benefits at the collective level but a loss at the personal level for the individual donor.

Three types of charities addressing needs resulting from the pandemic were available for participants to choose as the target of their donation: one at the international, one at the national, and one at the state (U.S.) or regional (Italy) level. In the context of a global pandemic, these three groups vary in level of inclusiveness but are all potentially definable as “ingroups,” depending on how the individual conceives of the “we” when thinking about their shared fate. In order to assess the causal influence of construal of the ingroup on prosocial decision-making, our study included an experimental manipulation intended to “prompt” the participant to think about the pandemic crisis in terms of one of the three levels of inclusiveness. Empirically, priming identification has been shown to influence prosocial behaviors and increase cooperation in experimental social interactions[38]. Accordingly, we expected these prompts to increase identification with the corresponding level and consequently donation at that level.

The nature of the experimental decision task and the content of the online survey allowed us to address two important questions about prosocial behavior in the context of an ongoing public health crisis. First, how is the propensity to give influenced by the individual’s own exposure to the health crisis? Second, how is charitable giving distributed across different levels of collective welfare and what determines which level is chosen?

Results

We preregistered hypotheses and a pre-analysis plan at https://osf.io/k74gm and https://osf.io/z82vc (See Supplementary Note SN1).

Majority of participants chose to make a donation

In both countries, a majority of survey respondents were willing to forego some or all of their bonus money to contribute to collective welfare. In the U.S., 63% of survey participants chose to donate at least some of their bonus to a charity; in Italy, 77% of participants made a donation. For those who chose to donate, the average donation amount in the U.S. was $2.75 (.55 of bonus fund) and in Italy €2.48 (.63 of bonus fund). Overall, 40% of the bonus money was donated to the charities.

Personal exposure, and not county-level exposure, predicted giving

We used a hurdle model to assess simultaneously the effects of COVID-19 exposure on both the probability of choosing to donate to a charity (*P*) and conditional donations (*CD*), that is, the amount donated conditional on being a donor (see Methods). The model included a set of demographic variables, the participant’s political orientation and area of residence, and the exogenously assigned prompt treatment (see Supplementary Information: Supplementary Table 1 for descriptive statistics of the variables). We used as our measure of environmental exposure to disease the county-level count of cases per 100,000 inhabitants in the county where the participant resided (see Methods). This environmental exposure measure proved to have no significant effect on either *P* (p=0.99) or *CD* (p=0.74) in the U.S.. In Italy, it was at the margin of statistical significance for *P* (p=0.098) and had no significant effect on *CD* (p=0.59) (see Table 1, columns 1-2 and 5-6).

We conjectured that the lack of significant effects may have been due to county-level data providing only a coarse, though the most disaggregated available, measure of exposure. It is plausible that only when an individual or their close acquaintances are personally afflicted by the disease does the perception of the threat of the disease become psychologically compelling. We therefore added to our pre-analysis plan a dummy variable of participants’ self-reported personal exposure. Participants were identified as “exposed” if they, their family members, or their acquaintances, had been diagnosed with, or had died from, COVID-19 (see Methods and Supplementary Table 1). This variable was positively and significantly associated with both *P* (p= 0.020 for U.S.; p=0.093 for Italy) and *CD* (p= 0.016

for U.S.; p=0.092 for Italy; see Table 1, columns 3-4 and 7-8 and Figure 1 for means). When the data for the two countries were combined into one analysis, the COVID-19 personal exposure effect was significant (p=0.005 for *P*, and p=0.002 for *CD*) and there was no significant difference between countries in the size of this effect (p=0.82 for *P*, and p=0.73 for *CD*) (see Supplementary Table 2c).

	United States				Italy			
	Model 1		Model 2		Model 1		Model 2	
DEP VAR	*P*	*CD*	*P*	*CD*	*P*	*CD*	*P*	*CD*
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age	0.003**	0.003**	0.003**	0.004**	0.002	0.001	0.002	0.001
	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.002]	[0.001]	[0.002]
Female	0.101***	0.104***	0.097***	0.100**	0.055*	0.049	0.053*	0.046
	[0.023]	[0.031]	[0.023]	[0.031]	[0.026]	[0.031]	[0.026]	[0.031]
Conservative scale	-0.051***	-0.058***	-0.049***	-0.055***	-0.092***	-0.088***	-0.090***	-0.086***
	[0.010]	[0.013]	[0.010]	[0.013]	[0.014]	[0.016]	[0.014]	[0.016]
Income	0.019***	0.015+	0.018**	0.013+	0.006	0.007	0.006	0.007
	[0.006]	[0.008]	[0.006]	[0.008]	[0.007]	[0.008]	[0.007]	[0.008]
County-level COVID Exposure	0.001	0.00	0.001	0.00	0.001	0.003+	0.001	0.003
	[0.002]	[0.003]	[0.002]	[0.003]	[0.002]	[0.002]	[0.002]	[0.002]
Personal COVID Exposure			0.058*	0.077*			0.045+	0.054+
			[0.024]	[0.033]			[0.027]	[0.032]
LR chi2	88.66	48.62	95.04	53.96	83.81	41.23	87.07	44.05
Observations	932	932	932	932	723	723	723	723

Table 1 | Econometric analysis of probability of being a donor (*P*) and of conditional donation (*CD*). Estimates of marginal effects from two-part hurdle models are reported. The dependent variable is the share of bonus donated to a charity, without identifying which charity had been chosen. *CD* is the amount donated conditional on being a donor. The first column in each model reports the marginal effects from a Probit model to estimate *P*. The second column in each model reports the marginal effects for *CD*. In addition to the covariates reported above, all models also include controls for education level, indicator for size of respondent's location, income, whether the individual reported an income loss because of COVID-19, priming (state/country/world), macro-region dummies (South/North for Italy and South/Midwest/Northeast/West for the U.S.), and an indicator identifying individuals who were either born abroad or whose parents were born abroad. The full regression output is reported in the Supplementary Table 2a. Variables are defined in Supplementary Table 1. Standard errors are in brackets. *** = p<0.001, ** = p<0.01, * = p<0.05, + = p<0.10

Figure 2 provides a graphic representation of the distribution of contribution decisions for personally exposed and non-exposed respondents. It is of interest to note that willingness to donate 100% of the bonus money was greater for the personally-exposed participants, and this was particularly the case in Italy. For respondents in the U.S., knowing someone who was diagnosed with the illness increased both the probability of deciding to donate by 9% and the average donation by 9.2% of the bonus. The marginal effects were similar in Italy, with personal exposure increasing the probability of donating by 7.5% and the amount donated by 5.8% of the bonus. Thus, a significant effect of personal exposure to COVID-19 was replicated across the two countries, affecting both the propensity to donate and the amount given.

Charities at the most local level attracted most donations

In both countries, the modal option for donations was to donate to the charity at the most local level – namely, the participant's state of residence in the U.S. and region of residence in Italy. As shown in Figure 3, 41.0% did so in the U.S. and 32.9% in Italy. The national charity was more frequently selected in Italy (26.6% of the sample) than in the U.S. (13.0%), and the same pattern occurred for the international charity, which was selected by 17.4% of participants in Italy and 9.33% in the U.S.. We call 'Aggregate Donations' (*AD* henceforth) the overall amount of money allocated to

each of the four options (i.e. self and the three charities). *AD* offers a comprehensive measure of the money allocated to each charity, as it combines both the extensive margin (which charity is chosen) and the intensive margin (how much money is donated conditional on choosing a certain charity).

In the U.S., 65.2% of the bonus money available was kept for oneself, 21.5% went to the state-level charity, while 7.5% and 5.8% of *AD* was allocated to the national and international charity, respectively. *AD* allocated to the state-level charity was significantly higher than both country-level *AD* ($p<0.001$) and world-level *AD* ($p<0.001$), and country-level *AD* was also significantly higher than world-level *AD* ($p=0.025$), in a repeated-measures Tobit model (see Supplementary Table 4) having the same covariates as the model used previously.

In Italy, 51.8% of bonus money was kept, while 18.6% went to the regional charity. 16.3% and 13.2% of Italian participants allocated their *AD* to national and international charities, respectively. *AD* were more evenly distributed in Italy than in the U.S., as *AD* to the regional charity were not significantly different, at conventional levels, than *AD* to national charities ($p=0.080$), but *AD* to the world charity were significantly lower than *AD* to the regional charity ($p<0.001$) and to the national charity ($p=0.005$). *AD* allocated to state-level charities in the U.S. were significantly higher than *AD* allocated to regional charities in Italy ($p=0.018$) in a pooled repeated-observation Tobit model (Supplementary Table 4), and Italian participants donated significantly more to national charities ($p<0.001$) and to international charities ($p<0.001$) than U.S. participants.

People choosing the world charity donated significantly more than those choosing other charities

We analyzed *CD* – the intensive margin of donations – with respect to the distribution of allocations to the three different charities. *CD* to the world charity were the highest among the three in both countries, followed by *CD* to the national charity, and *CD* to the state/regional charity (Fig. 4). *CD* to the international charity were significantly higher than *CD* to the state charity in the U.S. ($p=0.007$), and significantly higher than either *CD* to regional charities ($p<0.001$) or national charities ($p<0.001$) in Italy (Supplementary Table 2b). In other words, participants who selected the world charity gave more than participants selecting the state or regional charities. Therefore, the finding that *AD* was highest for the state/regional charity must have been driven by the extensive margin of donation rather than the intensive margin.

Prompting had limited effects on where donations were directed

As described in the Methods section, each participant was randomly assigned to a different framing condition aiming to prompt individuals to portray COVID-19 as a problem for (a) the state of residence (in the U.S.) or region of residence (in Italy) (*Local Prompt* henceforth), (b) the country (*National Prompt*), or (c) the world (*World Prompt*). In the Control condition, no geographical connotation was provided.

After ascertaining the exogeneity of the prompt to the main demographic characteristics of the samples (Supplementary Table 6), we used a multivariate Tobit model to analyze the effect of the three prompts on aggregate donations at the local, national or world level. This model enables us to capture the interdependent nature of the charity choice for donation (see Methods). We found that none of the prompts increased donations significantly in the U.S. in comparison to the Control condition. This was the case for each of the three levels of donation, using the same covariates as in our previous models (Table 2, columns 1-3). In Italy, the *World Prompt* consistently had a significant effect in increasing donations to the world charity ($p=0.027$) while also having a negative effect on national donations ($p=0.022$). The *National Prompt* had no effect ($p=0.44$), while the *Local Prompt* was at the margins of significance at conventional levels in increasing contributions to the local charity ($p=0.073$; Table 2, columns 7-9).

Overall, then, the prompt manipulation proved to have little influence on donation decisions and apparently was not powerful enough to override participants' prior perspective on the scope of the pandemic crisis. Nor did it affect the predicted mediator of social identification at the different levels (see Supplementary Table 7, and Supplementary Note SN2).

Social identity strongly affected donation choice

In experimental research on social dilemmas, the strength of social identification with an ingroup increases intragroup cooperation[39,40]. Social identity has been found to be a relevant factor to explain cooperation in a nested social dilemma game, particularly at the global level[37]. As laid out in our pre-registration plan, we conjectured that the same would be the case for the other levels of choice. Thus, further analyses were conducted to look at the effects of social identification itself, independent of the prompts.

Figure 5 displays the relationship between strength of social identity at each level and aggregate donations at the corresponding level for U.S. and Italy. We employed a Tobit multivariate model to predict *AD* from social identity, using the same set of covariates used in previous models. Our hypotheses were confirmed in that social identity at each level was a significant predictor of donation at that level. This was the case both in the U.S. and Italy for local ($p<0.001$ in both countries), national ($p=0.021$ in the U.S., $p<0.001$ in Italy) and global identity ($p=0.001$ in the U.S., $p<0.001$ in Italy; Table 2, columns 4-6 and 10-12). Moreover, we found that there were no significant differences in the effects of social identity in the two countries in a pooled model (Supplementary Table 5b), corroborating the robustness of this result. Similar results were obtained analyzing the effect of social identity on the probability of choosing one of the three charities (Supplementary Tables 5c-d). The effect of social identity was also robust to the inclusion of additional possible explanatory factors, such as trust in other people (see Supplementary Tables 5a-b and Supplementary Note SN3).

Donations were motivated by concern for others' needs and charity efficiency

While social identity offers a general explanation for altruistic behavior that could span several contexts, the choices made by our participants may have been influenced by more specific factors connected with their perceptions about charities at each level. First, a participant may have been motivated to give to a charity expecting to be on the receiving end from that charity's activity in the future. This may explain the larger share of overall giving to regional charities. In other words, people may expect that their Per Capita Return – i.e. the level of personal benefit from donations – would be higher for the regional charities than the national and the global charity. Several laboratory experiments confirm that individuals are indeed sensitive to the Per Capita Return when giving to a public good[41] – even when the choice of giving runs against their self-interest, as in our experiment. Alternatively, according to generalized bounded reciprocity theory, people are motivated to cooperate by the expectation that other people within the group will also cooperate[42]. In other words, it is the willingness to comply with a commonly shared social norm of cooperation, thus reciprocating others' altruistic behavior, that induces people to cooperate. If this motivation were active in our experiment, we would then expect people to donate at the level where they most expect others to donate. Other possible accounts concern the perceived capacity of a certain charity to achieve its goals, and its efficiency in meeting goals without wasting money[43]. Finally, people may be motivated by a purely altruistic desire to help people most in need because of the effects of COVID-19. Perceived need has been found to be a strong motivator of pro-social behavior[44].

	United States						Italy					
	Model 1			Model 2			Model 1			Model 2		
DEP VAR: AD	State	Country	World	State	Country	World	Region	Country	World	Region	Country	World
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Age	0.009***	-0.011*	0.00	0.008***	-0.011*	0.002	0.009**	-0.011**	0.002	0.007*	-0.010*	0.005
	[0.002]	[0.005]	[0.006]	[0.002]	[0.005]	[0.006]	[0.003]	[0.004]	[0.006]	[0.003]	[0.004]	[0.006]
Female	0.131**	0.124	0.086	0.138**	0.117	0.07	0.144*	0.06	-0.127	0.165*	0.043	-0.142
	[0.049]	[0.108]	[0.135]	[0.048]	[0.107]	[0.133]	[0.067]	[0.081]	[0.123]	[0.067]	[0.081]	[0.121]
Conservative scale	-0.032	-0.095*	-0.183**	-0.045+	-0.121*	-0.126+	0.084*	-0.051	-0.627***	0.044	-0.062	-0.511***
	[0.021]	[0.047]	[0.063]	[0.023]	[0.054]	[0.069]	[0.036]	[0.046]	[0.088]	[0.037]	[0.048]	[0.084]
Priming State/Region	-0.022	-0.071	-0.134	-0.033	-0.078	-0.113	0.169+	-0.051	-0.069	0.198*	-0.098	-0.099
	[0.068]	[0.151]	[0.196]	[0.067]	[0.150]	[0.195]	[0.094]	[0.110]	[0.179]	[0.092]	[0.109]	[0.174]
Priming Country	-0.091	-0.048	-0.083	-0.09	-0.064	-0.045	0.118	-0.087	0.084	0.128	-0.096	0.039
	[0.069]	[0.149]	[0.194]	[0.067]	[0.148]	[0.192]	[0.096]	[0.113]	[0.176]	[0.094]	[0.111]	[0.171]
Priming World	-0.06	-0.121	0.228	-0.067	-0.12	0.256	0.125	-0.268*	0.372*	0.133	-0.287*	0.331*
	[0.067]	[0.147]	[0.180]	[0.066]	[0.146]	[0.179]	[0.094]	[0.117]	[0.168]	[0.092]	[0.115]	[0.163]
Local Social Identity				0.214***	-0.208**	-0.270**				0.298***	-0.271***	-0.132
				[0.035]	[0.080]	[0.102]				[0.055]	[0.069]	[0.100]
National Social Identity				-0.021	0.202*	-0.037				-0.119*	0.315***	-0.218*
				[0.038]	[0.088]	[0.108]				[0.055]	[0.071]	[0.101]
Global Social Identity				-0.053	0.093	0.292**				-0.095*	-0.049	0.489***
				[0.033]	[0.069]	[0.089]				[0.048]	[0.060]	[0.102]
LR chi2		100.34			174.58			178.66			270.91	
Observations		932			932			723			723	

Table 2 | Econometric analysis of Aggregate Donations (*AD*). We fit multivariate Tobit models to estimate *AD* for each of the three charities. *AD* is the overall amount of donations to each charity, combining both the extensive margin (which charity is chosen) and the intensive margin (conditional donations to each charity). In addition to the covariates reported above, all models also include controls for education level, indicator for respondent's location size, income, whether the individual reported an income loss because of COVID-19, macro-region dummies (South/North for Italy and South/Midwest/Northeast/West for the U.S.), an indicator identifying individuals who were either born abroad or whose parents were born abroad, and county-level and personal exposure to COVID-19. The full regression output is reported in the Supplementary Table 5a. Variables are defined in Supplementary Table 1. Standard errors are in brackets. *** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Preliminary data relevant to these questions about motives for donation were obtained from analyses of responses to an open-ended question at the end of the survey questionnaire in the U.S. survey. The question asked participants to give a short answer about why they made the decision to donate or not. No responses provided by participants made explicit reference to expectations that any of the charities would benefit themselves. Among those who chose to donate, 56% mentioned others' need or wanting to help others as their reason for giving. In addition, a small percentage (4%) mentioned perceived effectiveness as their reason for choosing a particular charity and most of these referred to the state level.

To pursue this more systematically, the Italian survey included a set of structured questions regarding specific characteristics of charities at the regional, country, or world level that may have affected giving behavior. (This analysis was not part of our pre-analysis plan, so it should be considered as supplementary to our hypothesis-testing results). We had one item for each of the possible factors mentioned above: perception of (a) Per Capita Return, (b) bounded generalized reciprocity, (c) charity's effectiveness and (d) efficiency, and (e) awareness of need (see Supplementary Table 1 for item wording and Supplementary Note SN4 for details on the analysis).

We applied the same multivariate Tobit model used in the previous section to explain *AD*, adding the five items jointly to the regression (see Supplementary Table 8). We did not find support for the idea that donating to a certain charity would have benefitted the individual, at any level of donation (p=0.37 for the regional charity; p=0.39 for the national charity; p=0.78 for the international charity). Likewise, the hypothesis that people were motivated by donating at the

same level as others did not receive support for any level of donation (p=0.76 for the regional level, p=0.053 for the national level - with an opposite sign to the one expected-, p=0.66 for the world level). Support was found for the other three factors. The one having the highest weight was the perception of a charity's effectiveness in pursuing its goal of providing relief from COVID-19: participants who rated a specific level of charity as most effective gave significantly more at the corresponding level (p=0.008 for regional level, p<0.001 for other levels). A somewhat weaker relationship was observed for the perception of the charity efficiency, with efficiency ratings significantly predicting donations at the regional level (p=0.001), and country level (p=0.041), but not at the world level (p=0.29). Finally, the perception of people's needs also acted as a strong determinant of donations at the respective levels (p=0.001 for regional aid, p=0.31 for national aid; p<0.001 for international aid). Overall, it seems that participants had truly altruistic concerns in benefitting those charities better capable of providing relief and helping those in greater need, while assessments of which charity may benefit themselves in the future had a limited role.

Liberals and females donated significantly more than conservatives and men

Our pre-registration plan provided for analysis of political ideology and some demographic characteristics as potential determinants of donation choices. As is reported in Tables 1 and 2, we found that liberals were significantly more likely to donate in general, and particularly to world charities, than conservatives. This was the case in both countries, with the effect of conservatism being stronger in Italy than the U.S., after controlling for other factors (Supplementary Table 2c, Supplementary Table 5b). This result supports other literature indicating that political leaning is a strong factor affecting pro-sociality and social attitudes[45]. We also found that women were more generous than men in both countries. When looking at donation amount there was an overall effect of age with older people giving more on average. However, the direction of the effect of age varied across the different charities (Table 2). We found no effects for education and only sporadic effects for income in the U.S. but not in Italy, with richer people tending to give more to the state level (see Supplementary Notes SN3 for a more detailed analysis).

It should be noted that all of these demographic variables were included as control variables in our primary analytic models. Our pre-analysis plan included the analyses of other variables as possible factors of the choice to donate – specifically, psychological, social and economic vulnerability, and trust in other people. These variables generally had no significant effects, with the only exception of trust in others (Supplementary Tables 5a-b and Supplementary Note SN3).

All these demographic and attitudinal variables had essentially similar effects when analyzing the probability of choosing a certain charity, rather than *AD* to that charity (Supplementary Tables 5c-d and Supplementary Note SN3). We also examined the possibility of experimenter demand effects associated with our framing manipulation but found little evidence that participants guessed experimenter intent or that such guesses influenced their choice of charity (Supplementary Note SN5).

Discussion

Giving to a charity is the quintessential altruistic action, as individuals give up resources to benefit unknown others. It has been posited that human cooperation rests on psychological dispositions to help others in conditions of threat to the community and resource scarcity. Such dispositions were likely favored by multi-level selection forces in situations of inter-group conflict [3,46,47]. Our finding that people donated a significant amount of resources in a situation of existential threat like COVID-19 is consistent with such theories and offers novel evidence that pro-social behavior is widespread even in situations of radical uncertainty.

Our evidence that direct personal exposure to the pandemic is associated with greater giving is also consistent with this theory. A complementary explanation is that when people are personally exposed to the pandemic, feelings of empathy for those closest to them extend to unknown others[24], albeit primarily in a parochial manner. No evidence of a significant effect of environmental exposure to the disease on altruistic behavior is found when we measure the actual number of cases in the participant's area. This suggests that the subjective psychological construal of the crisis is somehow independent from the "objective" threat faced by people in their area of residence[48], and that direct personal exposure acts as a factor to activate pro-social behavior. It was only when the coronavirus hit closest to home – affecting those known to the respondent – that exposure increases willingness to contribute to a collective good.

Several patterns in our study are observed in both the United States and Italy, lending robustness to our results. In particular, the willingness to benefit most the group at the lowest levels of inclusiveness, the tendency for people more personally exposed to COVID-19 to donate more, and the moderating effect exerted by social identity are found in both countries at comparable levels of intensity. Nonetheless, contributions to more inclusive groups – country and world – were also substantial and larger in Italy than the U.S. – suggesting that inclusiveness may be affected by contextual factors such as the uneven regional distribution of the threat in question, the time of the outbreak, and the nature of governmental response to the pandemic.

A speculative conjecture is that the circumstances surrounding responses to the COVID-19 pandemic in the U.S. made the state and county levels of government largely responsible for policies implemented to curb the spread of the disease. As a consequence, interdependence at the state level was made particularly salient and the state became the social unit most likely to elicit expectations of mutual aid. In Italy, on the other hand, the response to the pandemic was largely directed from the national level of government, making national identification more salient.

Another pattern that is consistent across both countries is the finding that those who donated to world charities donated more than others. These results are consistent with previous research showing that people having cosmopolitan attitudes are overall more generous than others[35,37,49]. While theoretical analyses and empirical studies have posited a parochial character for cooperation, such studies have typically examined behaviour in the context of individuals belonging to one group *in opposition to* another group, be it a national, ethnic, natural, or an artificially created group. Our study takes a different approach in that groups are characterised by their different levels of inclusiveness, rather than by ingroup-outgroup differentiation. Our study thus complements and extends traditional approaches to the topic of parochialism and cosmopolitanism.

Although we cannot draw direct policy implications from the present study[50], we believe that the evidence provided may inform the policy debate in several directions. While our study signals the existence of a substantial portion of people willing to contribute to the common good, the largest proportion of resources are still kept for the self. Policies must consider the heterogeneity in behavior existing within the population, which is also manifested along gender, age and political affiliation cleavages. The preference for helping at the state level in the U.S. and regional level in Italy should also be taken into account when designing relief packages and appeals for aid. Many global leaders have lamented the current failure of multi-lateral governance in addressing the spread of COVID-19, let alone facing up to other global challenges affecting our planet. Our findings suggest that whatever global effort is constructed to address the current and other ongoing global crises, it will have to consider the markedly parochial character of cooperation observed in our study.

Like every systemic shock, the COVID-19 pandemic may be seen as a strong stressor to a society's social cohesion. Social cohesion thrives on solidarity and a society's capacity to provide mutual help. In this respect, we are comforted

by the observation that altruism remains a strong motivating factor in the midst of the crisis. This offers hope that societies will have the necessary resilience to tackle the crisis, even if its protracted nature may put societies under severe strain in the near future.

Methods

Ethical approval

Our research plan was approved by the Institutional Review Board for Human Subjects at the University of South Carolina (Pro00099715) for the U.S., and by the Reggio Emilia Behavioral and Experimental Laboratory for Italy. Participation in the research was voluntary; the survey was preceded by a description of the study and participants signified consent by clicking “Continue.”

Period of fieldwork and recruitment methods

The survey was conducted during the week between 13th and 20th of May 2020 in the United States. At this time, much of the U.S. was still dealing with the pandemic as an ongoing crisis, with some states having reached an initial peak and others still increasing in diagnosed cases and deaths (see Supplementary Fig. 1). Respondents (N=932) were recruited from the Prolific worker pool, screened to include only U.S. citizens or permanent residents and by the use of quota sampling to achieve equal participation across the four Center for Disease Control (CDC) regions of the U.S. and two age groups ([18-30], [over 30]).

A replication of the survey was conducted in Italy between the 11th and 23rd of June 2020. We strived to ensure comparability between the two country samples. Respondents in Italy (N=723) were recruited from the same worker pool used in the U.S., thus ensuring roughly comparable socio-economic characteristics for participants from the two countries, and their exposure to identical survey procedures. Monetary incentives were made equivalent in the two countries using the Economist’s Big Mac Index issued in January 2020. We applied quota sampling for geographical residence, gender and age, to ensure equal frequencies in the two countries according to these dimensions. Using the four CDC regions for the U.S. and the two areas of North and South in Italy seemed appropriate to ensure both balanced population sizes and cultural differentiation within each country. Age quotas in Italy were anchored to that obtained in the U.S.. The survey questionnaire was translated from the original English version into Italian by bilingual members of the research team, and cross-checked with a third party.

Demographic characteristics

Basic demographic characteristics of the U.S. and Italian samples are reported in Supplementary Table 1. There were approximately equal numbers of males and females in both samples and a broad range of participants from different demographic groups. The resulting Italian sample had a somewhat lower average age than the U.S. sample, ultimately reflecting lower computer literacy rates of elderly people in Italy compared to the U.S. Respondents in the U.S. sample also had higher education and income levels, reflecting real-life population differences. These demographic variables were controlled for in all analyses.

Decision Task and Framing

The full survey is reported in the Supplementary Note SN6. After participants had responded to a small number of demographic questions (including the respondent’s state or region of residence), the critical decision task was introduced as part of the survey questionnaire. The decision was preceded by a short paragraph reminding participants of the seriousness of the COVID-19 pandemic as a medical and economic crisis. This paragraph provided

for the introduction of our framing manipulation. In a Control condition, the content of the paragraph described the consequences of the pandemic in general terms with no mention of any specific geographical region. In the three experimental framing conditions, the content was the same but specific references were inserted to the respondent's state or region, to the nation (United States or Italy), or to the world, respectively (Full content of the framing paragraph in all four conditions is provided in the Supplementary Note SN6: Section I.2). Participants in the survey were randomly assigned to receive one of the four opening frames.

Participants then received instructions for the critical decision task. After being informed that they would receive a bonus for participating, they were given the opportunity to either keep all the money for themselves or to donate some or all of it to one of three aid organizations providing food, medical and other assistance to those impacted by the pandemic. They were also informed that donations would be doubled by a matching donation from the researchers (For detailed wording, see Supplementary Note SN6: Section I.3).

Respondents were given a comprehension test to be sure they understood the nature of the decision (Supplementary Note SN6: Section I.4). (A participant would be rejected from the study in the event of failure after three test trials, with no further collection of data. The attrition rate due to test failure was 13% in the U.S. and 16% in Italy). They were then asked whether they wanted to make a donation to one of the three listed charities or preferred not to donate. If they chose to make a donation, they specified how much, in any amount up to $5 (€4).

Predictor Variables

In addition to the donation decision variables as our primary dependent measures, we used both exogenous data sources and participants' responses to items in the survey questionnaire to construct indices for the predictor variables noted in our preregistration.

COVID-19 county-level exposure. For our index of environmental exposure to COVID-19, we deviated from the pre-registered analysis plan, which provided for the use of death per 100,000 inhabitants in the participant's county of residence. Since this measure was not available at the county level in Italy, we opted for using the number of confirmed cases per 100,000 inhabitants instead. (Regressions using the death measure at the state/region level produced qualitatively similar results. See Supplementary Table 3).

We created our environmental exposure measures by utilizing public health data on incidence of COVID-19 cases in each respondent's district of residence. To create this index, the most immediate geographic unit for which systematic data were available was used. In the U.S. both number of cases and number of deaths were available at the county level. In Italy case data was available at the province (NUTS-3) level, roughly equivalent to county level in the U.S..

In the U.S. we obtained county-level COVID-19 case counts using the data from The New York Times, based on reports from state and local health agencies[51]. This database reports cumulative number of cases and deaths attributed to COVID-19 at different geographical levels daily. This database is updated regularly using reports from state and local health agencies and was made public in late March. We downloaded the cumulative number of cases for each respondent's county for the day before the survey completion date. We merged to this data set 2019 county population estimates from Census Bureau for a given county (or city) and created a per capita rate of cases per 100,000 inhabitants[52].

In Italy we obtained province (county)-level COVID-19 case counts from the database maintained by the official site of the national Civil Protection[53]. This database reports cumulative number of cases attributed to COVID-19 at different geographical levels daily. We downloaded cumulative number of cases for each respondent's county for the day

before the survey completion date. We merged to this data set 2019 county population estimates from the Italian National Institute of Statistics (ISTAT) and created a per capita rate of cases per 100,000 inhabitants.

Personal exposure to COVID-19. Although our preregistration plan focused on environmental exposure to COVID-19, we also assessed exposure at the individual level. Participants responded to a series of questions asking whether they or others they knew had been diagnosed with COVID-19 and whether they knew anyone who had died as a consequence of contracting the virus. Responses to these questions were used to classify participants as 0 (no contact with diagnosed others) or 1 (self or known others diagnosed, or died) as our index of personal exposure to the pandemic (Supplementary Table 1 and Supplementary Note SN6: Section I.6).

Region of residence. A dummy variable for region of the country (4 CDC regions in the U.S.; North vs South in Italy) where each participant resided was included in all models to control for main effects of region when looking at effects for county-level exposure data.

Political ideology: Conservativism scale. In addition to standard demographic variables (age, sex, 2019 household income, level of education, country of birth), we measured participants' political orientation on a 5-point scale where 1 means "very Liberal" and 5 means "very Conservative" (see Supplementary Table 1).

Social Identity Scales. We used answers to three questions inquiring about the participant's attachment, closeness, and perception of being a typical member of the local, national, and international community, to construct a measure of social identity for each level considered in our study[37] (see Supplementary Note SN6: Section I.8 for item wording). Ratings for each item were made on a 4-point scale and then averaged to create an index of strength of social identity at each level of collectivity.

Econometric methods

We used a variety of econometric models to analyze the different dependent variables of our study.

Hurdle model: The hurdle model[54] consists of two tiers and enables us to capture the marginal effects for both the decision on whether to donate or not, and how much to donate. The decision of whether to donate or not (extensive margin) was modelled through a Probit model, while the decision on how much to donate (intensive margin) was modeled using a linear specification. While in the pre-analysis plan we specified the use of a double hurdle model, we opted for a single hurdle model because of the paucity of observations at the second hurdle (that is, full donations), and because of (well-known) instability in convergence of double hurdle model. Models were estimated using the churdle command in Stata© 16.

Repeated-Observation Tobit model: In addition to hurdle models, we estimated models of donation using a Tobit specification. Unlike hurdle models where two separate indices determined the probability of being a donor and the amount given, in a Tobit setup the parameters of a single latent index of willingness to give were estimated. By introducing controls for charity type we also captured the differential willingness to donate for each type of charity. Binary decision to donate or not were estimated as the probability of this index being untruncated. Conditional on this index being untruncated, amount donated was fitted. Heteroschedasticity-robust standard errors were computed through the bootstrap method with 1,000 repetitions. These models were estimated using xttobit command in Stata© 16.

Multivariate Tobit and Probit models: We estimated the multivariate model with Correlated Mixed-Process framework using the *cmp* command in Stata© 16[55]. This framework extends Zellner's Seemingly Unrelated Regression Equations

model[56] to estimate wide range of flexible systems of equations with correlated errors.

Authors' Contribution

MBB, NRB, GG conceived study. MBB, NRB, GG, ODO created survey. ODO implemented survey. GG, AP, GU adapted survey to Italian sample. ODO, GG, AP, GU collected data. ODO, AP, GG processed and analyzed data. ODO provided analytical tools. MBB, NRB, GG drafted manuscript. All authors reviewed and commented on the final manuscript.

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Figures

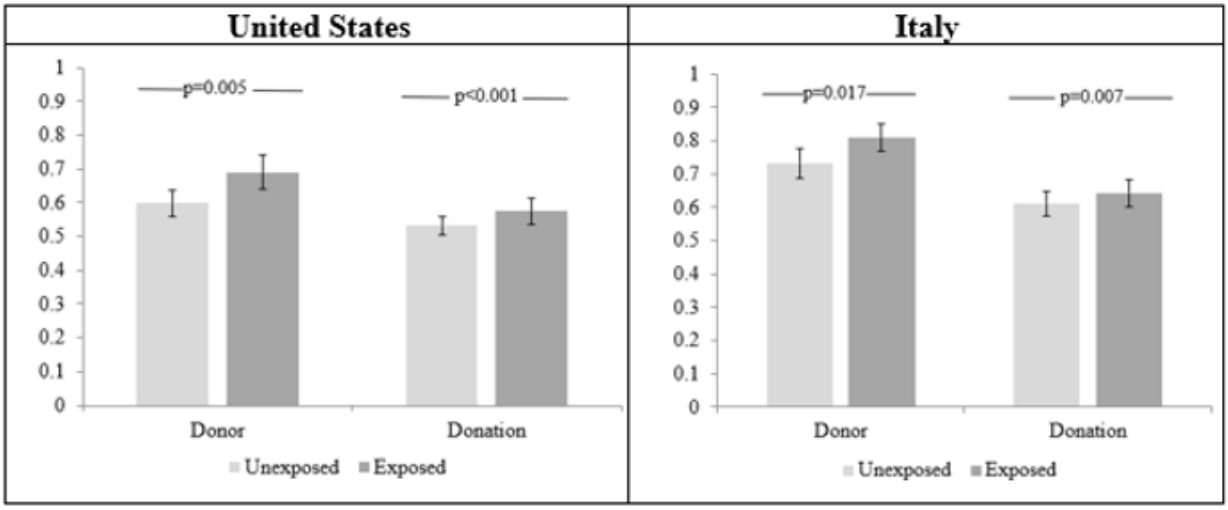

Figure 1

Impact of personal exposure to COVID-19 on frequency of donations and amount donated. 'Donor' is a dichotomous variable taking value of 1 if a participant donated a positive sum to a charity, and 0 otherwise. 'Donation' is the amount donated, as a share of the bonus available for donation. The two panels report the means of the two variables, broken down by participants personally unexposed and exposed to COVID-19 in U.S. and Italy. Participants were identified as "Exposed" if they, their family members, or their acquaintances, had been diagnosed with, or had died from, COVID-19. Unexposed participants were all others. The whisked bars denote 95% confidence intervals obtained from bootstrapped errors with 10,000 repetitions. The p-values report significance levels of a Fisher exact test (for 'Donor') and of a Mann-Whitney Wilcoxon test (for 'Donation') that the observations for Exposed and Unexposed individuals come from the same distribution.

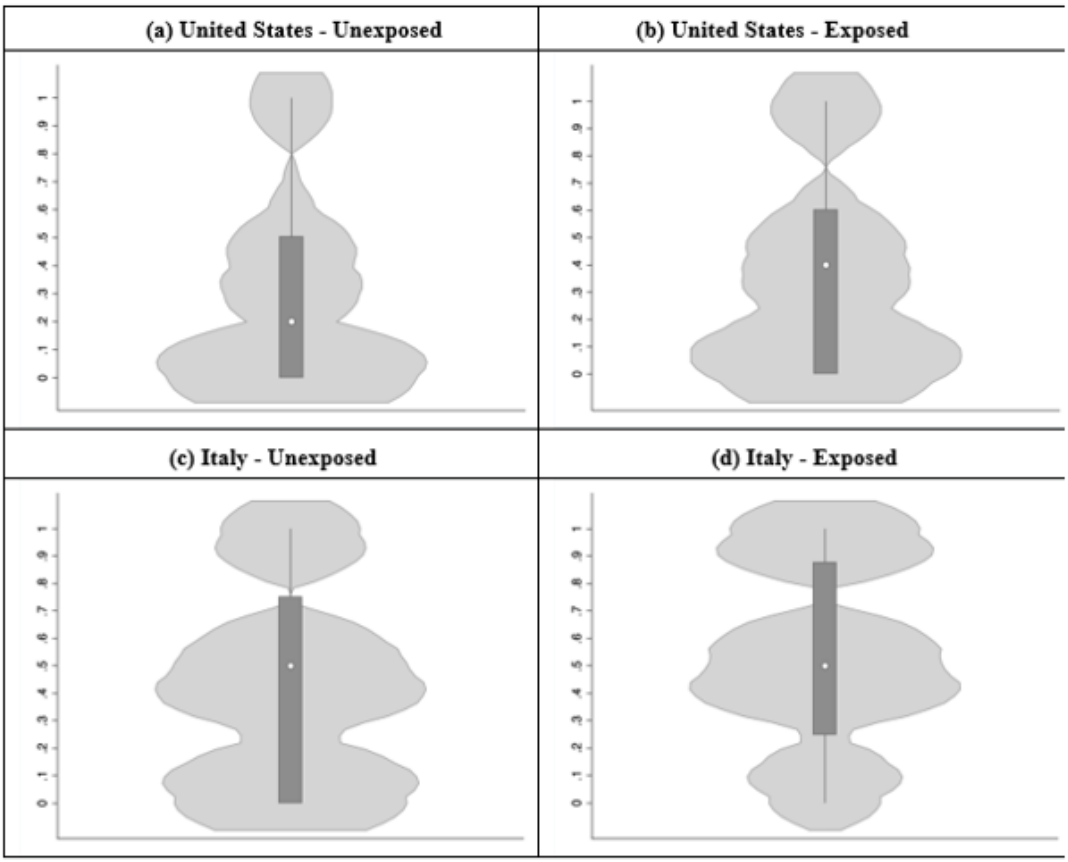

Figure 2

Distribution of Amount Donated by country and Exposure to COVID-19. Distribution plots include a white point indicating the median of the distribution, a box indicating the interquartile range (from 25th percentile up to 75%) percentile, and spikes extending to the upper- and lower-adjacent values. Overlaid with this box plot is the density of the distribution, estimated by k-density.

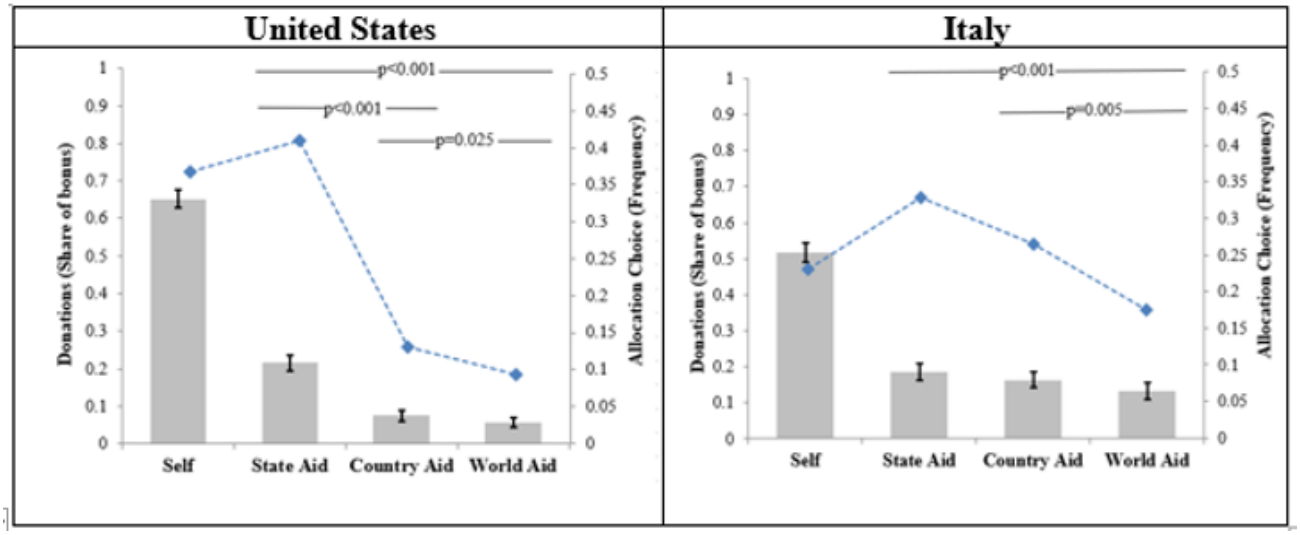

Figure 3

Patterns of bonus allocation. The frequency with which each charity is selected (blue diamonds, scale on the right-hand y-axis) and the mean levels of aggregate donations (AD) to each charity and the amount kept for self (bars, scale on left-hand y-axis) are plotted. Spikes indicate the confidence intervals for mean AD, obtained from bootstrapped standard errors with 10,000 repetitions. The p-values report significance levels of t-tests on the null hypothesis of equality of pairs of coefficients estimated in Supplementary Table 4, columns 1-2. Significance levels for pairwise tests between allocation to self and contribution to charities, which are in all cases significant at p<0.001, are not plotted.

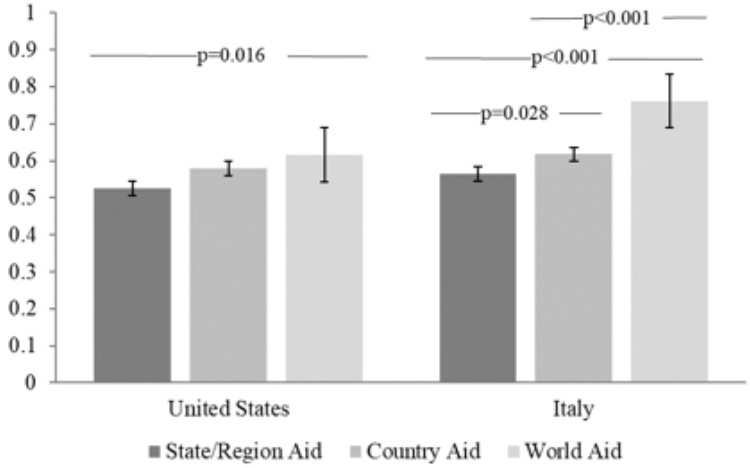

Figure 4

Conditional Donations. The shares of bonus donated to a charity, conditional on donating, are plotted. The p-values report significance levels of Mann-Whitney-Wilcoxon tests on the null hypothesis that observations come from the

same distribution. Spikes indicate the confidence intervals for mean CD, obtained from bootstrapped standard errors with 10,000 repetitions.

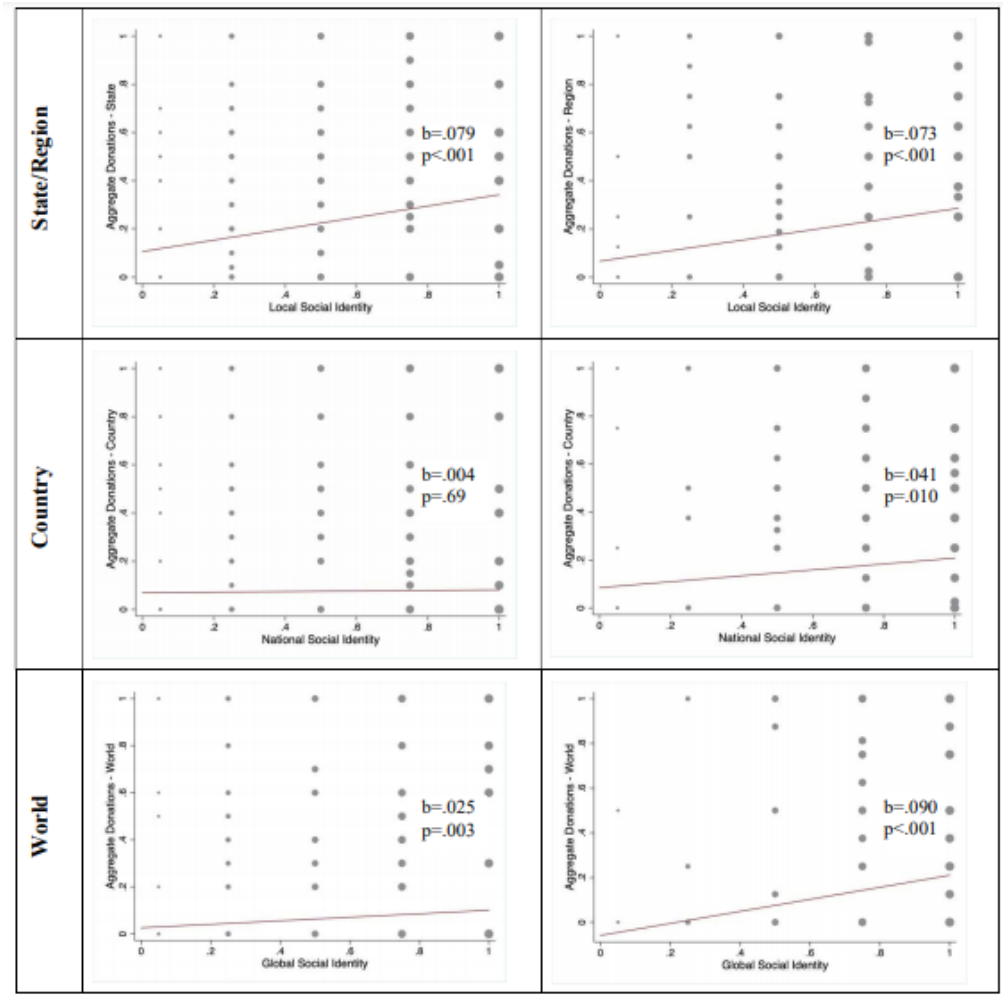

Figure 5

Relationship between social identity and corresponding level of aggregate donations. We plot the relationship between the three social identity scores (x-axis) and aggregate donations (y-axis). We grouped social identity scores on five, equally sized, bins. The size of the dots is determined by observed frequencies. The red lines are the OLS-best-fit interpolating lines. b is the slope of the interpolating line and p is the significance level of a t-test on the hypothesis that the slope is equal to zero.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- SupplementaryInformation.pdf