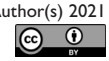
Special Issue: COVID

Cooperation and Trust Across Societies During the COVID-19 Pandemic

Journal of Cross-Cultural Psychology
2021, Vol. 52(7) 622–642



DOI: 10.1177/0022022120988913
journals.sagepub.com/home/jcc


Angelo Romano[*1], Giuliana Spadaro[*2], Daniel Balliet[2], Jeff Joireman[3], Caspar Van Lissa[4], Shuxian Jin[2], Maximilian Agostini[5], Jocelyn J. Bélanger[6], Ben Gützkow[5], Jannis Kreienkamp[5], and PsyCorona Collaboration, N. Pontus Leander[5]

Abstract

Cross-societal differences in cooperation and trust among strangers in the provision of public goods may be key to understanding how societies are managing the COVID-19 pandemic. We report a survey conducted across 41 societies between March and May 2020 ($N = 34{,}526$), and test pre-registered hypotheses about how cross-societal differences in cooperation and trust relate to prosocial COVID-19 responses (e.g., social distancing), stringency of policies, and support for behavioral regulations (e.g., mandatory quarantine). We further tested whether cross-societal variation in institutions and ecologies theorized to impact cooperation were associated with prosocial COVID-19 responses, including institutional quality, religiosity, and historical prevalence of pathogens. We found substantial variation across societies in prosocial COVID-19 responses, stringency of policies, and support for behavioral regulations. However, we found no consistent evidence to support the idea that cross-societal variation in cooperation and trust among strangers is associated with these outcomes related to the COVID-19 pandemic. These results were replicated with another independent cross-cultural COVID-19 dataset ($N = 112{,}136$), and in both snowball and representative samples. We discuss implications of our results, including challenging the assumption that managing the COVID-19 pandemic across societies is best modeled as a public goods dilemma.

Keywords

cooperation, trust, COVID-19, institutions, social dilemmas, culture

[1]Leiden University, Leiden, Netherlands
[2]Vrije Universiteit Amsterdam, Amsterdam, Noord-Holland, Netherlands
[3]Washington State University, Pullman, WA, USA
[4]Utrecht University, Utrecht, Netherlands
[5]University of Groningen, Groningen, Netherlands
[6]New York University, Abu Dhabi, United Arab Emirates

*Angelo Romano and Giuliana Spadaro contributed equally to this work.

Corresponding Authors:

Angelo Romano, Leiden University, Wassenaarseweg 52, Leiden, 2333 AK, Netherlands.
Email: a.romano@fsw.leidenuniv.nl

Giuliana Spadaro, Vrije Universiteit Amsterdam, De Boelelaan 1105, Amsterdam, 1081HV, Netherlands.
Email: g.spadaro@vu.nl

Introduction

The COVID-19 outbreak poses pressing challenges within and between nations to manage the spread of the disease. To address these challenges, several recent papers have drawn on social science principles in an effort to understand and change behavior. One common theme in this line of work is that managing the spread of the disease poses a social dilemma (e.g., a public goods dilemma; Johnson et al., 2020; Van Bavel et al., 2020), which is defined as a situation in which individuals experience a conflict between short-term self-interest and long-term interest of the collective. From this perspective, many of the behaviors required to successfully deal with the COVID-19 crisis—such as maintaining social distance, frequent hand washing, and self-imposed quarantine—involve a joint effort where individuals must pay a short-term cost to enhance the long-term collective good (e.g., health and safety of citizens, well-functioning health care institutions). Drawing on this line of thinking, recent research discusses a variety of social dilemmas people face when dealing with the COVID-19 crisis and suggests a number of policy interventions based on theory and research on cooperation in social dilemmas (e.g., detachment from non-cooperators, decentralized and centralized punishment systems; Johnson et al., 2020).

Although theory and research on social dilemmas have often been applied to understand a range of societal problems (e.g., provision of public goods, management of common resources, for reviews see Parks et al., 2013; Van Lange et al., 2013), some have cautioned against developing COVID-19 policy recommendations before first testing key assumptions about the relevance and applicability of social and behavioral science principles to the pandemic. In one intriguing critique, IJzerman et al. (2020) suggested that insights intended to inform COVID-19 policy recommendations should be evaluated within rocket science's nine stages of Technology Risk Levels. At stage 1, for example, researchers have reliably observed a phenomenon within a controlled environment. At stage 2, resulting principles should be tested in applied settings. And by stage 9, a system (e.g., solution) should be effective in multiple applications within real-world settings. Viewed in this light, offering policy recommendations based on the assumption that responses to COVID-19 reflect a social dilemma is likely premature. Indeed, although a long tradition of research on social dilemmas has yielded useful insights into cooperation within controlled lab settings and several real-world settings (Joireman et al., 2004; Ostrom, 1990; Rustagi et al., 2010; Van Vugt & Samuelson, 1999), no published work has directly tested whether theory and research on social dilemmas represent a firm basis for advancing COVID-19 policy recommendations.

With this in mind, the present work examines the usefulness of theory and research on cross-societal differences in cooperation and trust for predicting early prosocial COVID-19 responses (e.g., social distancing)—a proxy for first-order cooperation in the dilemma—and support for behavioral regulation policies aimed at addressing the pandemic (e.g., mandatory quarantine)—akin to second-order cooperation to support an institution to solve the social dilemma. More specifically, as illustrated in Figure 1, we test a series of pre-registered hypotheses linking these COVID-19 responses to established cross-societal differences in cooperation and trust (among strangers) in social dilemmas (Gächter et al., 2010; Romano et al., 2017) as well as societal and ecological factors theorized to shape norms of cooperation in social dilemmas (Hruschka & Henrich, 2013). We evaluate these hypotheses with multi-level models, utilizing country-level data (for cooperation, trust, and societal factors) to predict individual-level data (for prosocial COVID-19 responses and support for behavioral regulation policies).

Cooperation, Trust, and Prosocial COVID-19 Responses Across Societies

Many of the actions people are asked to take to deal with COVID-19 involve cooperating with strangers: they impose a personal cost (e.g., social isolation) to benefit the collective (e.g.,

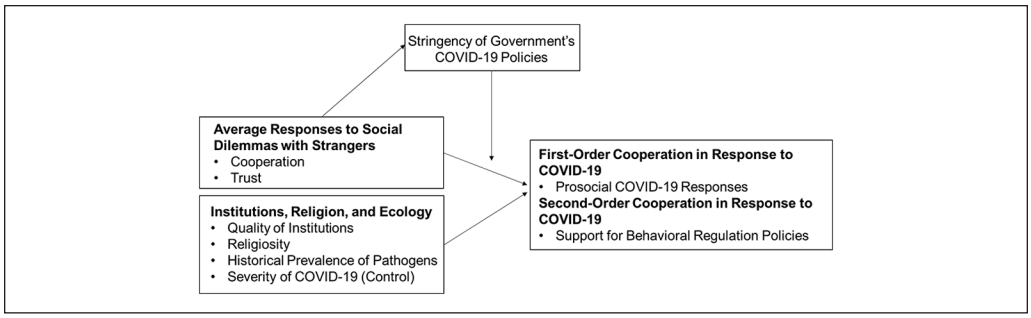


Figure 1. Conceptual model.
Note. Outcomes are individual-level variables. All other boxes include country-level variables.

protecting vulnerable populations; i.e., a social dilemma). Thus, a society's general tendency toward cooperation among strangers will likely be linked with specific levels of prosocial responses to COVID-19. People are also conditional cooperators (Fischbacher et al., 2001), basing their behavior on what they expect others will do; that is, the expectation that others will likewise cooperate with the requested actions (Balliet & Van Lange, 2013; Rousseau et al., 1998). Thus, assuming COVID-19 behaviors pose a social dilemma, prosocial COVID-19 responses should also be positively linked with cross-societal differences in trust. Previous research on individual trust in the United States of America (USA) found that trust was related to more self-reported precautionary and preventive behaviors (e.g., washing hands and social distancing; Aschwanden et al., 2020). Accordingly, in the present study, we tested the hypotheses that prosocial COVID-19 responses (e.g., willingness to donate to pandemic relevant charities, following guidance to avoid public spaces) would be positively related to country-level cooperation (H1a) and trust (H1b) among strangers.

We further tested whether several theories that explain cross-societal differences in cooperation among strangers can be applied to understand variation in prosocial COVID-19 responses (Balliet & Van Lange, 2013; Richerson et al., 2016). In particular, it has been proposed that higher levels of cooperation among strangers can be found in societies characterized by: (a) higher quality of institutions, both actual and perceived (e.g., rule of law, government effectiveness, and institutional trust; Hruschka et al., 2014; Hruschka & Henrich, 2013), (b) higher religiosity (e.g., church attendance, religious beliefs, and historical exposure to Western Church (i.e., the historical impact of the Western Church on social relations via kinship-regulating policies (e.g., banning cousin marriage) that encouraged social exchange beyond kin; Norenzayan et al., 2014; Schulz et al., 2019)), and (c) ecologies with low historical prevalence of pathogens (e.g., Fincher & Thornhill, 2012). Drawing on this work, we expect stronger prosocial COVID-19 responses in societies characterized by higher quality of institutions (H2), greater religiosity (H3), and lower historical prevalence of pathogens (H4).

Cooperation, Trust, and Support for COVID-19 Behavior Regulation Policies

As discussed, cross-societal differences in cooperation and trust are expected to predict more prosocial COVID-19 responses (e.g., washing hands, staying at home). Past interdisciplinary research has also proposed that there exist cross-societal differences in the way different cultures *solve* social dilemmas (Yamagishi, Cook, et al., 1998). For instance, societies with lower cooperation and trust among strangers are more likely to solve social dilemmas by supporting the implementation of sanctioning systems that impose costs on free-riders (Yamagishi, Cook, et al., 1998). In contrast, other societies solve social dilemmas with higher cooperation and trust among

unrelated strangers, even in the absence of formal institutions, and therefore are less likely to support policies that monitor and sanction defectors (*individualistic view of culture*; Yamagishi, Cook, et al., 1998). Past research has tested these hypotheses in a limited set of countries (e.g., USA versus Japan) and found that societies with lower trust display more dramatic positive changes in cooperation and trust in the presence (versus absence) of regulations which monitor and sanction non-cooperative behaviors (*institutional view of culture*; Yamagishi, 1988; Yamagishi, Cook, et al., 1998; Yamagishi, Jin, et al., 1998).

Based on this work, we advanced two related hypotheses. First, given that low cooperation and low trust societies are more likely to rely upon formal sanctioning systems to solve social dilemmas, such societies should be more likely to support and implement centralized and decentralized behavioral regulation policies to address COVID-19 (e.g., support for mandatory quarantine of people exposed to the virus; H5a,b). Second, considering the larger positive impact of sanctioning systems in societies characterized by low cooperation and low trust (Yamagishi, 1988), the stringency of policies should have a stronger positive relation with prosocial COVID-19 responses in societies characterized by low (versus high) cooperation (H6a) and trust (H6b).

Methods

Prior to acquiring the data, the study proposal and analysis plan were pre-registered on OSF (https://tinyurl.com/y5yl7seo).[1] The research was approved by the Ethics Committees of the University of Groningen (PSY-1920-S-0390) and New York University Abu Dhabi (HRPP-2020-42). We used participant-level data collected from the PsyCorona Study, a large-scale cross-societal study on individual responses to COVID-19 (https://psycorona.org/). A recent published paper used similar outcome variables from the same dataset (i.e., prosocial COVID-19 responses, support for behavioral regulations) to address a different set of questions (see Jin et al., 2021).

Participants

Participants were recruited using a snowball sampling strategy. After providing their informed consent, participants completed the survey in one of 30 possible languages of their choice. The initial sample consisted of 36,702 participants across 115 societies during almost 2 months (from March 19th to May 11th 2020). Individuals' careless responding was accounted for by removing participants based on overall time of completion (i.e., less than 5 minutes, and providing inconsistent responses on reverse-coded items in one of the scales administered in the broader survey). Societies with fewer than 100 observations were excluded, which resulted in a final sample of 34,526 participants (68% females) from 41 societies (see Table 1 for an overview).

Outcome Variables (Individual-Level)

Individual-level variables were obtained from a subset of variables measured in the Baseline Survey of the PsyCorona Study. We extracted three sets of items measuring prosocial motivations, prosocial behaviors, and support for behavioral regulations related to COVID-19 (see Supplemental Table S3). All scales measuring these variables were used in aggregate levels, with the mean of available items computed for each scale.

Prosocial COVID-19 responses. Motivation to engage in prosocial behaviors related to the pandemic were assessed using a set of four items where participants stated their agreement about their willingness to (1) help others, (2) make donations, (3) protect vulnerable groups, and (4)

Table 1. Societies, Sample Sizes, Descriptive Statistics, and National Language Available to the Participants Included in the Analyses.

			% Age range			
Society	*N*	% Females	18–34	35–54	55+	National language
Algeria	200	37	51	47	2	Arabic
Argentina	232	69	63	23	13	Spanish
Australia	177	65	25	37	37	English
Bangladesh	155	30	87	9	3	Bengali
Brazil	288	72	28	44	27	Portuguese
Canada	472	72	58	26	15	English, French
Chile	320	76	49	38	12	Spanish
China	389	65	69	26	2	Simplified Chinese, Traditional Chinese
Croatia	353	80	72	22	5	Croatian
Egypt	902	85	94	4	1	Arabic
France	703	65	43	33	23	French
Germany	596	64	54	31	15	German
Greece	1,854	77	52	37	11	Greek
Hong Kong	243	65	67	25	5	Japanese
Hungary	442	83	78	15	6	Hungarian
Indonesia	1,445	54	69	23	7	Indonesian
Iran	315	54	67	20	6	Farsi
Italy	873	70	71	18	11	Italian
Japan	235	31	89	7	3	Japanese
Kazakhstan	809	56	52	44	3	Russian
Malaysia	892	71	55	36	8	Malay
Netherlands	1,944	69	43	32	20	Dutch
Pakistan	215	70	83	15	1	English, Urdu
Peru	163	64	63	31	5	Spanish
Philippines	496	69	65	29	6	English
Poland	714	82	59	31	8	Polish
Romania	1,655	67	61	31	8	Romanian
Russia	391	78	81	17	2	Russian
Saudi Arabia	483	77	47	43	9	Arabic
Serbia	1,074	80	63	28	8	Serbian
Singapore	245	71	78	18	3	English, Malay, Simplified Chinese
South Africa	258	76	33	43	24	English
South Korea	411	71	91	8	1	Korean
Spain	2,146	68	42	44	14	Spanish
Taiwan	164	70	63	35	2	Traditional Chinese
Thailand	155	58	65	33	3	Thai
Turkey	751	73	54	34	11	Turkish
Ukraine	451	79	54	39	6	Ukrainian
United Kingdom	809	73	42	29	28	English
USA	9,862	63	47	36	16	English
Vietnam	244	76	89	9	1	Vietnamese

Note. *N* = Sample size for each society. National language indicates which language, among the 30 available languages, reflected participants' national language. Percentages might not add up to 100% due to rounding and missing data in reporting age and gender.

make sacrifices to deal with COVID-19 pandemic on a 7-point Likert scale from 1 (*strongly disagree*) to 7 (*strongly agree*), Cronbach's $\alpha = 0.72$.

Prosocial behaviors were measured with four items in which people were asked about their agreement on whether they engaged in two social distancing behaviors (i.e., self-isolation and avoidance of public spaces) and one health prevention behavior (i.e., washing hands) on a 7-point Likert scale from 1 (*strongly disagree*) to 7 (*strongly agree*), Cronbach's $\alpha = 0.66$. The fourth item was a self-report measure of the number of times the respondent went outside in the past week, answered on a 4-point scale from 1 (*I did not leave my home*) to 4 (*four times or more*). This was considered a separate variable related to prosocial behavior and reverse-scored for interpretability, with higher scores meaning greater staying at home behavior.

Support for behavioral regulations. We assessed people's support for behavioral regulations aimed at curbing COVID-19 by aggregating responses to three items about whether participants would sign petitions to enforce compliance behaviors to reduce the spread of COVID-19 (i.e., support for mandatory vaccination, mandatory quarantine to people exposed to the virus, and reporting people who are suspected to be infected). Items were rated on a 7-point Likert scale from 1 (*strongly disagree*) to 7 (*strongly agree*), Cronbach's $\alpha = 0.67$.

Predictor Variables (Country-Level)

To operationalize country-level variables to be used as predictors in our model, we utilized data from previous cross-cultural studies (Falk et al., 2018; Romano et al., 2020) and open access cross-cultural databases (see Supplemental Table S4).

Cooperation. We operationalized country-level cooperation using a measure of cooperation from a recent online experiment run in December 2018 across 42 societies ($N = 18{,}411$, representative samples for gender, age, and income; Romano et al., 2020). Participants completed an online experiment, and were asked to make 12 independent one-shot decisions in a prisoner's dilemma game (PD) according to a stranger matching protocol (being paired with a different partner for each decision, and without receiving any feedback). In the PD, participants were endowed with 10 Monetary Units (MUs) and could decide how many of them to keep for themselves and how many to give to their partner. They were instructed that each MU given to their partner was doubled, and that their partner also had the option to give any amount to them, and that this amount too would be doubled. To make decisions comparable across societies, participants learned that each MU was worth the equivalent of 2.5 minutes of the average hourly wage in their country. Cooperation was assessed by the amount of resources invested in the PD (0-10).

As a robustness check of our hypotheses concerning cooperation, we also used a measure of norms of civic cooperation, retrieved from wave 6 of the World Value Survey (WVS; Inglehart et al., 2014) and computed by averaging three items assessing the extent to which specific behaviors are justifiable (i.e., claiming government benefits that you are not entitled to, avoiding a fare on public transportation, and cheating on taxes if you have a chance). Items were answered on a 10-point scale from 1 (*always justifiable*) to 10 (*never justifiable*).

Trust. We retrieved trust data from the Global Preference Survey (GPS; Falk et al., 2018). This survey was based on answers from 80,000 participants across 76 societies, in which trust was measured by means of one item on an 11-point Likert scale ("I assume that people have only the best intentions") from 0 (*does not describe me at all*) to 10 (*describes me perfectly*). This measure has been found to be predictive of behavior in the trust game (Falk et al., 2016). As a robustness check for our hypotheses concerning trust, we also used expectations of others' cooperation in the PD as a proxy of trust (Balliet & Van Lange, 2013). Expectations were assessed as stated

beliefs about the amount of resources expected to receive from the participant's partner in a PD, using the same study reported above for the measure of cooperation (Romano et al., 2020).

Stringency of COVID-19 policies. Stringency of a country's COVID-19 policies was operationalized as the maximum level of stringent measures a government has taken in response to the COVID-19 outbreak over a period of around 2 months, extracted from Oxford COVID-19 Government Response Tracker (OxCGRT; Hale et al., 2020). Maximum stringency captures the maximum level of restrictive policies applied by a society (e.g., school closing, workplace closing, restriction on internal travel) and ranges from 1 to 100, with higher scores indicating more stringent measures.

Quality of institutions. To operationalize the quality of institutions, we extracted two dimensions of governance from the World Bank (i.e., rule of law, government effectiveness; World Bank, 2011a, 2011b). Rule of law represents perceptions of the extent to which people have confidence in and abide by the rules of society. Government effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Both estimates range from approximately –2.5 to 2.5, with higher scores reflecting higher quality of institutions.

Religiosity. We used three measures (i.e., importance of religion, religious attendance, historical exposure to Western Church) to test our hypotheses related to religiosity. Importance of religion was assessed on a 4-point scale item from 1 (*not at all important*) to 4 (*very important*) and religious attendance on a 7-point scale item assessing how often respondents attended religious services from 1 (*never or practically never*) to 7 (*more than once a week*). Both items were extracted from wave 6 of the WVS (Inglehart et al., 2014) and reverse-scored so that higher scores indicated greater religiosity. Exposure to Western Church was calculated as the number of centuries each country was under the sway of the Western Church prior to 1500 CE, adjusted for population movements (Schulz et al., 2018, 2019). A region's Church exposure ranged from 0 to 1000, with higher scores implying a higher level of exposure to the Western Church.

Historical prevalence of pathogens. Historical prevalence of pathogens (e.g., leishmanias, schistosomes, trypanosomes) was extracted from Murray and Schaller (2010). This indicator rates prevalence of pathogens on a 4-point scale from 0 (*completely absent or never reported*) to 3 (*present at severe levels or epidemic levels at least once*), with higher scores revealing higher historical prevalence of pathogens.

Severity of the pandemic. We included severity of the pandemic as a control variable. We preregistered severity of the pandemic as the number of deaths and cases per million within 14 days of the first death, using data from Center for Systems Science and Engineering (CSSE; Dong et al., 2020) Global Cases. However, since there were countries where the pandemic started late, it was not possible to compare all countries. Therefore, we deviated from our pre-registration and decided to retrieve severity as the total number of deaths per million to April 21st 2020 (European Center for Disease Prevention and Control; ECDC). Higher scores indicated a more severe pandemic.

Analytic Strategy

To test our hypotheses, we used mixed-effects models with societies (level-2) as a random factor. To examine the main effect of cooperation and trust on prosocial COVID-19 responses, we ran

three sets of models to test our pre-registered hypotheses (H1a,b), each set with one predictor as a country-level fixed effect (i.e., cooperation and trust). In a second step, we added the interaction between stringency of policy and cooperation (trust; H6a,b). Moreover, we ran several independent models using quality of institutions, religiosity, and historical prevalence of pathogens (level-2) to predict prosocial COVID-19 responses, and support for behavioral regulations to address the pandemic (level-1; H2, H3, H4). Finally, to analyze the relation between cooperation, trust and stringency of actual COVID-19 policies, we used simple regressions (as all indicators are measured at the country level; H5a,b). All models included severity of the pandemic at the time of data collection as a control variable, and models using individual-level data additionally controlled for age and gender. All pre-registered hypotheses were tested using one-sided tests, whereas two-sided tests were used to perform robustness checks and analyses which were not pre-registered. We used all available data, without performing imputation of missing data. Importantly, as there is variation in the number of societies that overlap between different datasets, the actual number of societies included in each model may be different than the original number of societies collected in each dataset.

Results

Cooperation, Trust, and Prosocial COVID-19 Responses Across Societies

First, we tested whether societies characterized by higher levels of cooperation and trust among strangers reported more prosocial motivations and behaviors related to COVID-19 (H1a,b). An analysis of the intraclass correlation of the mixed-effects regression showed that there existed a substantial amount of between-society variation in prosocial motivations ($ICC = 0.125$) and behaviors (prosocial behaviors: $ICC = 0.081$; staying at home behavior: $ICC = 0.142$). In the mixed-effects regression (Table 2), counter to H1a,b, we found that cooperation ($p = .725$) and trust ($p = .056$) both had a non-significant relationship with prosocial motivations (Figure 2a and d).

Next, we tested our hypotheses on prosocial behaviors and staying at home behavior. We found that prosocial behaviors were not predicted by either cooperation ($p = .494$) or trust ($p = .500$; Figure 2b and c). Similarly, cooperation ($p = .709$) and trust ($p = .444$) had non-significant relationships with staying at home behavior (Figure 2c and f). In sum, results failed to support H1a and H1b. Men, compared to women, reported lower prosocial COVID-19 motivations, behaviors, and less staying at home behavior (see Table 2). There was no consistent association of age with prosocial COVID-19 responses (see Table 2, and for more details on age effects see Jin et al., 2020).

Finally, we tested whether individuals in societies characterized by higher levels of institutional quality and religiosity, and lower levels of historical prevalence of pathogens, reported more prosocial responses related to COVID-19 (H2, H3, H4). None of the cross-societal indicators (see Table 3) used to operationalize institutional quality, religiosity, or ecology were significantly related to prosocial motivations (p-values $> .057$). We only found that societies characterized by higher importance of religion reported higher likelihood of staying at home behavior ($b = 0.235$, $p = .001$). Also, societies characterized by higher degree of church attendance also reported higher likelihood of staying at home behavior ($b = 0.209$, $p = .005$).

Cooperation, Trust, and COVID-19 Policies Across Societies

We next tested whether individuals in societies characterized by lower cooperation and trust would report more support for centralized and decentralized regulations related to COVID-19 (H5a,b). We tested these hypotheses using two different dependent variables: first by analyzing

Table 2. Mixed-Effects Models of Cross-Societal Differences in Cooperation and Trust Predicting Individual-Level Prosocial COVID-19 Responses During the COVID-19 Pandemic.

		COVID-19 prosocial motivations				COVID-19 prosocial behaviors				Staying at home behavior			
Predictor	*N*	*b*	*SE*	*t*	*p*	*b*	*SE*	*t*	*p*	*b*	*SE*	*t*	*p*
Cooperation	29												
Cooperation		−0.059	0.098	−0.606	.725*	0.001	0.067	0.015	.494*	−0.062	0.110	−0.558	.709*
Age		0.012	0.005	2.547	.011	0.001	0.004	0.273	.785	−0.064	0.004	−15.099	<.001
Gender (Male = 1)		−0.164	0.014	−11.368	<.001	−0.258	0.011	−23.668	<.001	−0.204	0.013	−15.728	<.001
Gender (Other = 1)		0.085	0.084	1.011	.312	−0.154	0.063	−2.427	.015	−0.223	0.075	−2.955	.003
Trust	33												
Trust		0.130	0.079	1.636	.056*	0.000	0.048	0.001	.500*	0.011	0.077	0.143	.444*
Age		0.012	0.005	2.539	.011	0.001	0.003	0.193	.847	−0.059	0.004	−14.154	<.001
Gender (Male = 1)		−0.130	0.014	−9.189	<.001	−0.252	0.011	−23.812	<.001	−0.221	0.013	−17.579	<.001
Gender (Other = 1)		0.046	0.081	0.571	.568	−0.192	0.060	−3.175	.002	−0.242	0.072	−3.373	.001

Note. *N* = the number of societies included in the analyses.
Severity of the pandemic, gender, and age were included as a control in each model.
**p*-values are one-tailed.

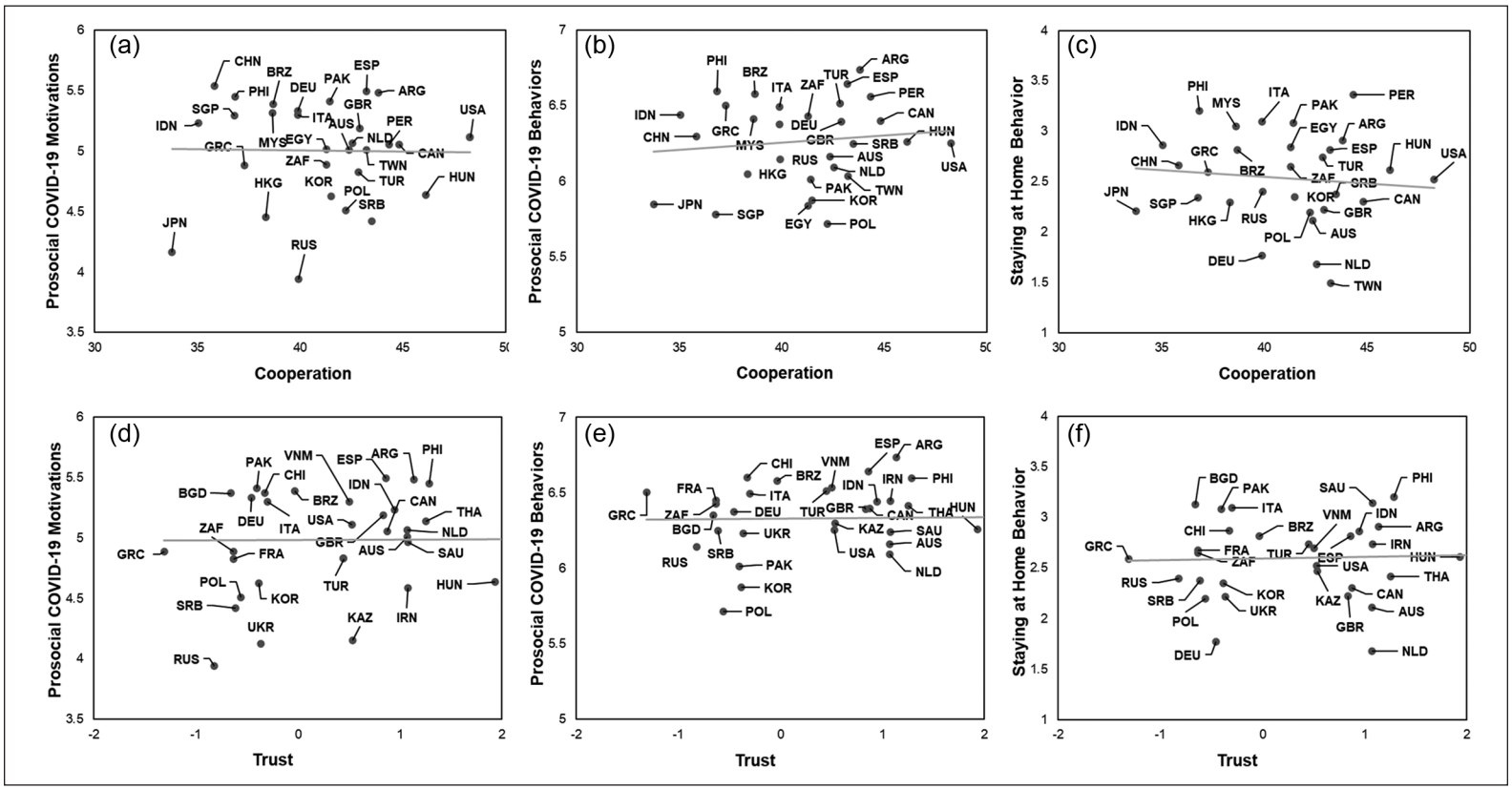


Figure 2. Pearson's correlations between cooperation, trust, and COVID-19 responses.

Note. (a) Correlation between cooperation and prosocial COVID-19 motivations (b) Correlation between cooperation and prosocial COVID-19 behaviors (c) Correlation between cooperation and staying at home behavior (d) Correlation between trust and prosocial COVID-19 motivations (e) Correlation between trust and prosocial COVID-19 behaviors (f) Correlation between trust and staying at home behavior.

Table 3. Mixed-Effects Models of Cross-societal Indicators Predicting Individual-Level Prosocial COVID-19 Responses During the COVID-19 Pandemic.

		COVID-19 prosocial motivations				COVID-19 prosocial behaviors				Staying at home behavior			
Cross-societal indicator	*N*	*b*	*SE*	*t*	*p*	*b*	*SE*	*t*	*p*	*b*	*SE*	*t*	*p*
Quality of institutions													
Rule of law	41	−0.013	0.070	−0.183	.572	−0.106	0.038	−2.790	.996	−0.247	0.055	−4.518	.999
Government effectiveness	41	−0.020	0.067	−0.305	.619	−0.100	0.036	−2.752	.996	−0.238	0.052	−4.602	.999
Confidence in government	28	0.088	0.084	1.048	.152	−0.011	0.053	−0.208	.582	−0.016	0.081	−0.200	.578
Confidence in parliament	28	0.073	0.080	0.916	.184	−0.005	0.050	−0.097	.538	−0.020	0.077	−0.260	.601
Confidence in courts	28	0.029	0.056	0.511	.307	−0.055	0.033	−1.641	.943	−0.090	0.051	−1.781	.957
Confidence in the police	28	0.044	0.063	0.690	.248	−0.034	0.039	−0.870	.804	−0.119	0.056	−2.119	.978
Confidence in armed forces	27	0.033	0.102	0.325	.374	−0.089	0.058	−1.535	.931	−0.021	0.097	−0.214	.584
Religion													
Importance of religion	28	0.140	0.085	1.640	.057	0.055	0.054	1.018	.159	0.235	0.071	3.300	.001
Church attendance	28	0.086	0.089	0.964	.172	0.051	0.055	0.918	.184	0.208	0.076	2.753	.005
Exposure to Western Church	31	0.013	0.074	0.178	.430	−0.003	0.047	−0.055	.522	−0.154	0.069	−2.225	.983
Ecology													
Historical prevalence of pathogens	37	0.183	0.076	2.415	.011	0.073	0.050	1.464	.076	0.226	0.077	2.948	.003

Note. *N* = the number of societies included in the analyses.
Severity of the pandemic was included as a control in each model.
All *p*-values are one-tailed.

Table 4. Mixed-Effects Models of Cross-Societal Differences in Cooperation and Trust Predicting Individual-Level Support for Behavioral Regulations During the COVID-19 Pandemic.

		Support for behavioral regulations			
Predictor	*N*	*b*	*SE*	*t*	*p*
Cooperation	29				
Cooperation		−0.122	0.118	−1.038	.154*
Age		−0.049	0.005	−9.074	<.001
Gender (Male = 1)		−0.131	0.016	−8.042	<.001
Gender (Other = 1)		−0.212	0.095	−2.234	.025
Trust	33				
Trust		0.181	0.099	1.841	.962*
Age		−0.049	0.005	−9.396	<.001
Gender (Male = 1)		−0.123	0.016	−7.765	<.001
Gender (Other = 1)		−0.278	0.091	−3.059	.002

Note. *N* = the number of societies included in the analyses.
Severity of the pandemic, age, and gender were included as a control in each model.
*p-values are one-tailed.

Table 5. Simple Regressions of Cross-Societal Differences in Cooperation and Trust Predicting Between Country Variation in the Stringency of Policies During the COVID-19 Pandemic.

		Stringency of policies			
Predictor	*N*	*b*	*SE*	*t*	*p*
Cooperation	32	0.289	0.26	1.111	.864
Trust	38	−0.128	0.169	−0.756	.227

Note. *N* = the number of societies included in the analyses.
Severity of the pandemic was included as a control in each model.
All *p*-values are one-tailed.

individual-level support for behavioral regulation policies, and then by whether countries actually implemented stricter policies. The intraclass correlation of the mixed-effects regression showed that there existed a substantial amount of between-society variation in support for behavioral regulations ($ICC = 0.150$). In a mixed-effects regression (Table 4), we did not find that trust or cooperation had a significant relationship with support for behavioral regulations (cooperation: $p = .154$, trust: $p = .962$). Men, compared to women, were associated with lower support for behavioral regulations (see Table 4).

Next, we regressed the stringency of measures taken by each society on cooperation and trust and found stringency was unrelated to both cooperation ($p = .864$) and trust ($p = .227$; Table 5).

We then tested the hypothesis that cooperation and trust each interacted with stringency of policies to predict prosocial motivations (H6a,b). In a mixed-effects regression (Table 6), neither cooperation ($p = .109$) or trust ($p = .744$) significantly interacted with stringency of policies in predicting prosocial motivations. We then tested the hypothesis that cooperation (and trust) interacted with the stringency of policies to predict prosocial COVID-19 behaviors (H6a,b). We did not find support for an interaction between stringency of policies and cooperation (or trust) for either prosocial behavior (p-values $> .534$) or staying at home behavior (p-values $> .334$). See Table 7 for an overview of the hypotheses.

Table 6. Mixed-Effect Models of Cross-Societal Differences in Cooperation, Trust, and Their Interaction With Stringency of Policies Predicting Individual-Level Prosocial COVID-19 Responses During the COVID-19 Pandemic.

		COVID-19 prosocial motivations				COVID-19 prosocial behaviors				Staying at home behavior			
Predictor	*N*	*b*	*SE*	*t*	*p*	*b*	*SE*	*t*	*p*	*b*	*SE*	*t*	*p*
Cooperation	29	−0.131	0.113	−1.159	.871	−0.005	0.078	−0.069	.527	−0.081	0.106	−0.761	.773
Cooperation × Stringency	29	−0.091	0.072	−1.265	.109	0.004	0.050	0.086	.534	0.033	0.068	0.484	.684
Trust	33	0.098	0.095	1.027	.157	−0.005	0.058	−0.093	.537	0.088	0.086	1.029	.156
Trust × Stringency	33	0.063	0.094	0.665	.744	0.021	0.057	0.370	.643	−0.037	0.085	−0.434	.334

Notes. *N* = the number of societies included in the analyses. × = interaction term.
Severity of the pandemic was included as a control in each model.
All *p*-values are one-tailed.

Table 7. Overview of the Support for the Pre-Registered Hypotheses.

#	Hypothesis	Supported
1a	Country-level cooperation would be positively related to prosocial COVID-19 responses.	
	Motivations	No
	Behaviors	No
1b	Country-level trust would be positively related to prosocial COVID-19 responses.	
	Motivations	Partly[1]
	Behaviors	Partly[1]
2	Prosocial COVID-19 responses would be positively related to quality of institutions.	
	Motivations	No
	Behaviors	No
3	Prosocial COVID-19 responses would be positively related to religiosity.	
	Motivations	No
	Behaviors	Partly
4	Prosocial COVID-19 responses would be negatively related to historical prevalence of pathogens.	
	Motivations	No
	Behaviors	No
5a	Societies with low, compared to high, cooperation would be more likely to support and implement behavioral regulations and stringent policies to address COVID-19.	
	Support for behavioral regulations	No
	Stringency of policies	No
5b	Societies with low, compared to high, trust would be more likely to support and implement behavioral regulations and stringent policies to address COVID-19.	
	Support for behavioral regulations	No
	Stringency of policies	No
6a	Stringency of policies would negatively interact with cooperation to predict prosocial COVID-19 responses.	
	Motivations	No
	Behaviors	No
6b	Stringency of policies would negatively interact with trust to predict prosocial COVID-19 responses.	
	Motivations	No
	Behaviors	No

Note. [1]Support for this hypothesis was found only with one of the two operationalizations of trust (i.e., expectations of others' cooperation). Results are presented in detail in the SI.

Additional Analyses: Robustness Checks, Cross-Validations, and Generalizations

We ran several additional analyses to test whether our results were robust across different (1) operationalizations of cooperation and trust, (2) model specifications, and (3) samples. First, we ran models using a different measure of cooperation (norms of civic cooperation) and trust (expectations of others' cooperation). We replicated most of our findings. Norms of civic cooperation had no statistically significant relations with COVID-19 responses or policies (*p-values* $>$ .095; see SI). We found expectations of cooperation were weakly associated with some prosocial COVID-19 responses (see SI). However, replicating the findings reported above, expectations of cooperation were unrelated to, support for policies ($p = .997$), and stringency of policies ($p = .634$). Overall, these analyses support our conclusion that cooperation and trust among strangers do not have a robust and consistent link with COVID-19 behavioral responses and policies.

Secondly, we tested our pre-registered hypotheses using a less restrictive threshold to determine inclusion of societies in the analyses ($N > 30$). In this way, we could replicate the confirmatory analyses with a broader set of countries ($N = 56$). Again, the results of this robustness check yielded the same pattern of results, compared to findings obtained by the models including larger samples ($N = 100$; see SI).

As a further robustness check, we tested our hypotheses on additional data from the same survey which only included age-gender representative samples ($N = 25{,}440$ participants from 24 countries) collected between April 10th and May 11th 2020 by the PsyCorona team (see SI). This allowed us to test the same hypotheses with the same variables (both at the country and at the individual level) but with a different sampling strategy. Again, the results of this robustness check confirmed our findings and provided the same pattern of results obtained analyzing responses gained through snowball sampling (see SI).

Finally, we tested our hypotheses on a different global COVID-19 dataset including individual COVID-19 responses collected during a similar timeframe (between March 20th and April 5th 2020), recently released online as open access (Fetzer et al., 2020). The survey was based on answers to a questionnaire available in 69 languages from 112,136 participants across 170 societies, recruited through snowball sampling. We retrieved three items that measured similar prosocial COVID-19 behaviors (i.e., "*I stayed at home*," "*I washed my hands more frequently than the month before*," *"I did not attend social gatherings"*). Participants were asked the extent to which these three statements described their behavior in the past week from 0 (*does not apply*) to 100 (*applies very much*). Consistent with our main findings, cross-societal variation in cooperation and trust failed to significantly predict prosocial COVID-19 behaviors across societies (*p-values* $> .108$; see SI).

Discussion

Recent review papers have suggested that many behaviors required to tackle the COVID-19 pandemic (e.g., maintaining social distance, washing hands, self-imposed quarantine) can be construed as social dilemmas, involving a conflict between short-term immediate self-interests and long-term collective benefits (Johnson et al., 2020; Van Bavel et al., 2020). If the COVID-19 pandemic indeed creates a social dilemma, then research on cross-societal differences on cooperation and trust should help predict responses to COVID-19 and potentially offer insights into policies that could regulate behaviors in response to COVID-19 (Johnson et al., 2020).

To address this question, we utilized a survey across 41 societies linking country-level predictors (cooperation, trust, institutional quality, religion, historical prevalence of pathogens) with individual-level prosocial COVID-19 responses, behaviors, and support for behavioral regulations to address COVID-19. Results revealed substantial cross-societal variation in individuals' self-reported *willingness* to engage in prosocial COVID-19 behaviors (e.g., social distancing, donating to charities), self-reported *actual* prosocial COVID-19 behaviors (e.g., hand washing, staying at home), and support for behavioral regulation policies (e.g., mandatory quarantine, vaccination). We applied theory and research on cooperation and trust across societies to predict these outcomes related to the COVID-19 pandemic. However, we did not find any consistent support for our pre-registered hypotheses that these cross-societal differences in prosocial COVID-19 responses and support for policies would be associated with country-level differences in cooperation or trust among strangers. These results were replicated using an additional dataset which included a larger sample of countries, and also when restricting the analyses in the present study to only include countries with age-gender representative samples of around 1,000 participants.

We also examined how several societal-level factors may play a role in responding to the pandemic. Several theories explain why societies differ in cooperation among strangers,

emphasizing the quality of institutions (Hruschka & Henrich, 2013), religiosity (Norenzayan et al., 2014), and historical prevalence of pathogens (Fincher & Thornhill, 2012). The current results, however, revealed no consistent association between these cross-societal factors and prosocial COVID-19 responses. We also did not find consistent support for our hypotheses that societies characterized by lower levels of cooperation (and trust) would implement stricter government policies. Societies with lower cooperation and trust also did not display larger increases in prosocial COVID-19 responses in relation to more stringent rules. Taken together, the results of this study question the value of using cross-cultural research on social dilemmas to guide policy making in response to the pandemic.

Although the COVID-19 pandemic may still create a large-scale public goods dilemma among strangers, cross-societal differences in cooperation and trust among strangers may not be relevant to individual decision-making in response to an emerging pandemic. Instead, COVID-19 responses may be understood in light of (1) individual differences in tendencies to trust and cooperate with strangers (Aschwanden et al., 2020), (2) proself motivations instead of prosocial, that is, people may engage in costly self-sacrifices (e.g., social distancing) to benefit themselves, their families, co-habitants, co-workers, and/or neighbors (not anonymous strangers), (3) a psychology functionally specialized for disease avoidance (Schaller, 2011; Tybur et al., 2013) instead of cooperation, and/or (4) differences in information about the pandemic across societies, which might play a major role in shifting how people perceive this situation (independent of whether the situation is truly a social dilemma). Accordingly, people may not even recognize their mutual dependence with broader societal members, and could frame the situation entirely different than a public goods dilemma, such as total independence from others (i.e., own and others' social distancing decisions don't affect others' outcomes) or as a situation with asymmetrical dependence (i.e., only the elderly benefit from one's costly cooperation; Balliet et al., 2017; Gerpott et al., 2018).

Another possibility is that COVID-19 does not create a public goods dilemma, but instead creates a different interdependent situation, which would produce a different set of expectations for behavior. For example, social distancing during the dilemma may best be understood as a chicken game (Smith & Price, 1973), where the most favorable outcome for each person is doing the opposite of what others choose to do. In this frame, costly self-sacrifices may result in the best outcome for an individual when others are not engaging in costly self-sacrifices (e.g., social distancing), but when other people are engaging in these costly behaviors, then people would achieve the best outcome by not making the sacrifices. However, in this kind of situation, everyone would receive a better outcome if each person engages in social distancing, relative to when each person does not. If the COVID-19 pandemic represents a chicken game, this would question the relevance of cooperation and trust in public goods dilemmas to understand responses to the pandemic. Indeed, we tested a number of pre-registered hypotheses based on the assumption that cooperation in a public goods dilemma among strangers would be key to understand variation across societies in responses to the pandemic, but we failed to find consistent support for these hypotheses across different datasets. Therefore, researchers wanting to extend implications of cross-societal cooperation research to policy in response to the pandemic would be advised to follow along these lines of inquiry, and collect data to test their assumptions and theory prior to making policy recommendations.

One limitation of the present research is worth noting. We used country-level indicators of cooperation and trust. Although we found considerable between-country variation in responses to the pandemic, this variation was not explained by cross-societal differences in cooperation and trust. While cross-societal differences in cooperation and trust have been widely used in past research to predict individual behaviors across societies (e.g., Gächter & Schulz, 2016; Romano et al., 2017; Schulz et al., 2019), future research can measure individual differences in cooperation and trust, and then examine whether these measures are able to detect cross-societal

variation in individual behaviors in response to the COVID-19 pandemic. Despite this limitation, the present study embodies several strengths, including (1) being guided by theory and pre-registered hypotheses about cooperation across societies, (2) utilizing a sample comprised of a large and varied set of societies, (3) revealing results which were robust across different operationalizations of the predictor variables (i.e., cooperation and trust) and outcome variables (i.e., motivations, behaviors), and (4) cross-validating the results with alternative datasets which comprised even larger number of societies and representative samples, addressing the possible concern that our results may be due to the sampling strategy and methods (see SI).

To conclude, we applied theory of human cooperation across societies to generate pre-registered hypotheses about prosocial COVID-19 responses across 41 societies and found no consistent support for these hypotheses. Previous papers have claimed that a social dilemma framework can guide policy making in response to the pandemic, without offering any empirical evidence about whether the pandemic actually poses a social dilemma, and whether theory and research from this domain apply to predict variation in behaviors in response to the pandemic. To guide evidence-based policies to address the pandemic, it is necessary to offer robust evidence that previous theory and research apply to this context. Cooperation may still be relevant to understanding responses to the pandemic, but the current findings strongly suggest the need to revisit fundamental assumptions about the nature of COVID-19 responses and do the relevant empirical research prior to making policy recommendations.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research received support from the New York University Abu Dhabi (VCDSF/75-71015), the University of Groningen (Sustainable Society & Ubbo Emmius Fund), and the Instituto de Salud Carlos III (COV20/00086). Data are available upon request.

PsyCorona Collaboration

Georgios Abakoumkin	University of Thessaly
Jamilah Hanum Abdul Khaiyom	International Islamic University Malaysia
Vjollca Ahmedi	Pristine University
Handan Akkas	Ankara Science University
Carlos A. Almenara	Universidad Peruana de Ciencias Aplicadas
Mohsin Atta	University of Sargodha
Sabahat Cigdem Bagci	Sabanci University
Sima Basel	New York University Abu Dhabi
Edona Berisha Kida	Pristine University
Nicholas R. Buttrick	University of Virginia
Phatthanakit Chobthamkit	Thammasat University
Hoon-Seok Choi	Sungkyunkwan University
Mioara Cristea	Heriot Watt University
Sára Csaba	ELTE Eötvös Loránd University, Budapest
Kaja Damnjanovic	University of Belgrade
Ivan Danyliuk	Taras Shevchenko National University of Kyiv

(continued)

Arobindu Dash	Leuphana University of Luneburg
Daniela Di Santo	University "La Sapienza", Rome
Karen M. Douglas	University of Kent
Violeta Enea	Alexandru Ioan Cuza University, Iasi
Daiane Gracieli Faller	New York University Abu Dhabi
Gavan Fitzsimons	Duke University
Alexandra Gheorghiu	Alexandru Ioan Cuza University
Ángel Gómez	Universidad Nacional de Educación a Distancia
Qing Han	University of Bristol
Mai Helmy	Menoufia University
Joevarian Hudiyana	Universitas Indonesia
Bertus F. Jeronimus	University of Groningen
Ding-Yu Jiang	National Chung-Cheng University
Veljko Jovanović	University of Novi Sad
Željka Kamenov	University of Zagreb
Anna Kende	ELTE Eötvös Loránd University, Budapest
Shian-Ling Keng	Yale-NUS College
Tra Thi Thanh Kieu	HCMC University of Education
Yasin Koc	University of Groningen
Kamila Kovyazina	Independent researcher, Kazakhstan
Inna Kozytska	Taras Shevchenko National University of Kyiv
Joshua Krause	University of Groningen
Arie W. Kruglanski	University of Maryland
Anton Kurapov	Taras Shevchenko National University of Kyiv
Maja Kutlaca	Durham University
Nóra Anna Lantos	ELTE Eötvös Loránd University, Budapest
Edward P. Lemay, Jr.	University of Maryland
Cokorda Bagus Jaya Lesmana	Udayana University
Winnifred R. Louis	University of Queensland
Adrian Lueders	Université Clermont-Auvergne
Najma Iqbal Malik	University of Sargodha
Anton Martinez	University of Sheffield
Kira O. McCabe	Vanderbilt University
Mirra Noor Milla	Universitas Indonesia
Jasmina Mehulić	University of Zagreb
Idris Mohammed	Usmanu Danfodiyo University Sokoto
Erica Molinario	University of Maryland
Manuel Moyano	University of Cordoba
Hayat Muhammad	University of Peshawar
Silvana Mula	University "La Sapienza", Rome
Hamdi Muluk	Universitas Indonesia
Solomiia Myroniuk	University of Groningen
Reza Najafi	Islamic Azad University, Rasht Branch
Claudia F. Nisa	New York University Abu Dhabi
Boglárka Nyúl	ELTE Eötvös Loránd University, Budapest
Paul A. O'Keefe	Yale-NUS College
Jose Javier Olivas Osuna	National Distance Education University (UNED)
Evgeny N. Osin	National Research University Higher School of Economics
Joonha Park	NUCB Business School
Gennaro Pica	University of Camerino

(continued)

Antonio Pierro	University "La Sapienza", Rome
Jonas Rees	University of Bielefeld
Anne Margit Reitsema	University of Groningen
Elena Resta	University "La Sapienza", Rome
Marika Rullo	University of Siena
Michelle K. Ryan	University of Exeter, University of Groningen
Adil Samekin	International Islamic Academy of Uzbekistan
Pekka Santtila	New York University Shanghai
Edyta Sasin	New York University Abu Dhabi
Birga M. Schumpe	New York University Abu Dhabi
Heyla A. Selim	King Saud University, Saudi Arabia, Riyadh
Michael Vicente Stanton	California State University, East Bay
Wolfgang Stroebe	University of Groningen
Samiah Sultana	University of Groningen
Robbie M. Sutton	University of Kent
Eleftheria Tseliou	University of Thessaly
Akira Utsugi	Nagoya University
Jolien Anne van Breen	Leiden University
Kees Van Veen	University of Groningen
Michelle R. vanDellen	University of Georgia
Alexandra Vázquez	Universidad Nacional de Educación a Distancia
Robin Wollast	Université Clermont-Auvergne
Victoria Wai-lan Yeung	Lingnan University
Somayeh Zand	Islamic Azad University, Rasht Branch
Iris Lav Žeželj	University of Belgrade
Bang Zheng	Imperial College London
Andreas Zick	University of Bielefeld
Claudia Zúñiga	Universidad de Chile

ORCID iDs

Angelo Romano https://orcid.org/0000-0002-7502-9268

Maximilian Agostini https://orcid.org/0000-0001-6435-7621

N. Pontus Leander https://orcid.org/0000-0002-3073-5038

Supplemental Material

Supplemental material for this article is available online.

Note

1. Compared to the pre-registration, we changed the order of the hypotheses.

References

Aschwanden, D., Strickhouser, J. E., Sesker, A. A., Lee, J. H., Luchetti, M., Stephan, Y., Sutin, A. R., & Terracciano, A. (2020). Psychological and behavioural responses to coronavirus disease 2019: The role of personality. *European Journal of Personality*. https://doi.org/10.1002/per.2281

Balliet, D., Tybur, J. M., & Van Lange, P. A. M. (2017). Functional interdependence theory: An evolutionary account of social situations. *Personality and Social Psychology Review*, *21*(4), 361–388. https://doi.org/10.1177/1088868316657965

Balliet, D., & Van Lange, P. A. M. (2013). Trust, conflict, and cooperation: A meta-analysis. *Psychological Bulletin*, *139*(5), 1090–1112. https://doi.org/10.1037/a0030939

Dong, E., Du, H., & Gardner, L. (2020). An interactive web-based dashboard to track COVID-19 in real time. *The Lancet Infectious Diseases*, *20*(5), 533–534. https://doi.org/10.1016/S1473-3099(20)30120-1

Falk, A., Becker, A., Dohmen, T., Enke, B., Huffman, D., & Sunde, U. (2018). Global evidence on economic preferences. *The Quarterly Journal of Economics*, *133*(4), 1645–1692. https://doi.org/10.1093/qje/qjy013

Falk, A., Becker, A., Dohmen, T. J., Huffman, D., & Sunde, U. (2016, January). *The preference survey Module: A validated instrument for measuring risk, time, and social preferences* (IZA Discussion Paper No. 9674). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2725035

Fetzer, T., Witte, M., Hensel, L., Jachimowicz, J. M., Haushofer, J., Ivchenko, A., Caria, S., Reutskaja, E., Roth, C., Fiorin, S., Gomez, M., Kraft-Todd, G., Götz, F., & Yoeli, E. (2020). Measuring worldwide COVID-19 attitudes and beliefs. *PsyArXiv*. https://osf.io/3sn2k/

Fincher, C. L., & Thornhill, R. (2012). Parasite-stress promotes in-group assortative sociality: The cases of strong family ties and heightened religiosity. *Behavioral and Brain Sciences*, *35*(2), 61–79. https://doi.org/10.1017/S0140525X11000021

Fischbacher, U., Gächter, S., & Fehr, E. (2001). Are people conditionally cooperative? Evidence from a public goods experiment. *Economics Letters*, *71*(3), 397–404. https://doi.org/10.1016/S0165-1765(01)00394-9

Gächter, S., Herrmann, B., & Thöni, C. (2010). Culture and cooperation. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *365*(1553), 2651–2661. https://doi.org/10.1098/rstb.2010.0135

Gächter, S., & Schulz, J. F. (2016). Intrinsic honesty and the prevalence of rule violations across societies. *Nature*, *531*(7595), 496–499. https://doi.org/10.1038/nature17160

Gerpott, F. H., Balliet, D., Columbus, S., Molho, C., & de Vries, R. E. (2018). How do people think about interdependence? A multidimensional model of subjective outcome interdependence. *Journal of Personality and Social Psychology*, *115*(4), 716–742. https://doi.org/10.1037/pspp0000166

Hale, T., Angrist, N., Cameron-Blake, E., Hallas, L., Kira, B., Majumdar, S., Petherick, A., Phillips, T., Tatlow, H., & Webster, S. (2020, November). *Variations in government responses to COVID-19*. (BSG Woriking Paper No. 2020/032). https://www.bsg.ox.ac.uk/covidtracker

Hruschka, D., Efferson, C., Jiang, T., Falletta-Cowden, A., Sigurdsson, S., McNamara, R., Sands, M., Munira, S., Slingerland, E., & Henrich, J. (2014). Impartial institutions, pathogen stress and the expanding social network. *Human Nature*, *25*(4), 567–579. https://doi.org/10.1007/s12110-014-9217-0

Hruschka, D. J., & Henrich, J. (2013). Institutions, parasites and the persistence of in-group preferences. *PLoS One*, *8*(5), e63642. https://doi.org/10.1371/journal.pone.0063642

IJzerman, H., Lewis, N. A., Przybylski, A. K., Weinstein, N., DeBruine, L., Ritchie, S. J., Vazire, S., Forscher, P. S., Morey, R. D., Ivory, J. D., & Anvari, F. (2020). Use caution when applying behavioural science to policy. *Nature Human Behaviour*, *4*(11), 1092–1094. https://doi.org/10.1038/s41562-020-00990-w

Inglehart, R., Haerpfer, C., Moreno, A., Welzel, C., Kizilova, K., Diez-Medrano, J., Lagos, M., Norris, P., Ponarin, E., & Puranen, B. (2014). *World values survey: Round six - Country-pooled datafile version*. Retrieved April 23, 2020, from www.worldvaluessurvey.org/WVSDocumentationWV6.jsp

Jin, S., Balliet, D., Romano, A., Spadaro, G., van Lissa, C. J., Agostini, M., Bélanger, J. J., Gützkow, B., Kreienkamp, J., PsyCorona Collaboration, & Leander, P. N. (2021). Intergenerational conflicts of interest and prosocial behavior during the COVID-19 pandemic. *Personality and Individual Differences*, *171*, 110535. https://doi.org/https://doi.org/10.1016/j.paid.2020.110535

Johnson, T., Dawes, C., Fowler, J., & Smirnov, O. (2020). Slowing COVID-19 transmission as a social dilemma: Lessons for government officials from interdisciplinary research on cooperation. *Journal of Behavioral Public Administration*, *3*(1), 1–13. https://doi.org/10.30636/jbpa.31.150

Joireman, J., Van Lange, P. A. M., & Van Vugt, M. (2004). Who cares about the environmental impact of cars? Those with an eye toward the future. *Environment and Behavior*, *36*(2), 187–206. https://doi.org/10.1177/0013916503251476

Murray, D. R., & Schaller, M. (2010). Historical prevalence of infectious diseases within 230 geopolitical regions: A tool for investigating origins of culture. *Journal of Cross-Cultural Psychology*, *41*(1), 99–108. https://doi.org/10.1177/0022022109349510

Norenzayan, A., Shariff, A. F., Gervais, W. M., Willard, A. K., McNamara, R. A., Slingerland, E., & Henrich, J. (2014). The cultural evolution of prosocial religions. *Behavioral and Brain Sciences*, *39*, 1–19. https://doi.org/10.1017/S0140525X14001356

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press.

Parks, C. D., Joireman, J., & Van Lange, P. A. M. (2013). Cooperation,trust,and antagonism: How public goods are promoted. *Psychological Science in the Public Interest*, *14*(3), 119–165. https://doi.org/10.1177/1529100612474436

Richerson, P., Baldini, R., Bell, A. V., Demps, K., Frost, K., Hillis, V., Mathew, S., Newton, E. K., Naar, N., Newson, L., Ross, C., Smaldino, P. E., Waring, T. M., & Zefferman, M. (2016). Cultural group selection plays an essential role in explaining human cooperation: A sketch of the evidence. *Behavioral and Brain Sciences*, *39*, 1–68. https://doi.org/10.1017/S0140525X1400106X

Romano, A., Balliet, D., Yamagishi, T., & Liu, J. H. (2017). Parochial trust and cooperation across 17 societies. *Proceedings of the National Academy of Sciences of the United States of America*, *114*(48), 12702–12707. https://doi.org/10.1073/pnas.1712921114

Romano, A., Sutter, M., Liu, J. H., Yamagishi, T., & Balliet, D. (2020). National parochialism is ubiquitous around the globe [Manuscript submitted for publication].

Rousseau, D. M., Sitkin, S. B., Burt, R. S., & Camerer, C. (1998). Not so different after all: A cross-discipline view of trust. *Academy of Management Review*, *23*(3), 393–404. https://doi.org/10.5465/AMR.1998.926617

Rustagi, D., Stefanie, E., & Kosfeld, M. (2010). Conditional cooperation and costly monitoring explain success in forest commons management. *Science*, *330*(6006), 961–965. https://doi.org/10.1126/science.1193649

Schaller, M. (2011). The behavioural immune system and the psychology of human sociality. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *366*(1583), 3418–3426. https://doi.org/10.1098/rstb.2011.0029

Schulz, J., Bahrami-Rad, D., Beauchamp, J., & Henrich, J. (2018). The Origins of WEIRD psychology. *SSRN Electronic Journal*. Elsevier BV. https://doi.org/10.2139/ssrn.3201031

Schulz, J. F., Bahrami-Rad, D., Beauchamp, J. P., & Henrich, J. (2019). The Church, intensive kinship, and global psychological variation. *Science*, *366*(6466), eaau5141. https://doi.org/10.1126/science.aau5141

Smith, J. M., & Price, G. R. (1973). The logic of animal conflict. *Nature*, *246*(5427), 15–18. https://doi.org/10.1038/246015a0

Tybur, J. M., Lieberman, D., Kurzban, R., & DeScioli, P. (2013). Disgust: Evolved function and structure. *Psychological Review*, *120*(1), 65–84. https://doi.org/10.1037/a0030778

Van Bavel, J. J., Baicker, K., Boggio, P. S., Capraro, V., Cichocka, A., Cikara, M., Crockett, M. J., Crum, A. J., Douglas, K. M., Druckman, J. N., Drury, J., Dube, O., Ellemers, N., Finkel, E. J., Fowler, J. H., Gelfand, M., Han, S., Haslam, S. A., Jetten, J., & Weeden, K. A. (2020). Using social and behavioural science to support COVID-19 pandemic response. *Nature Human Behaviour*, *4*(5), 460–471. https://doi.org/10.1038/s41562-020-0884-z

Van Lange, P. A. M., Joireman, J., Parks, C. D., & Van Dijk, E. (2013). The psychology of social dilemmas: A review. *Organizational Behavior and Human Decision Processes*, *120*(2), 125–141. https://doi.org/10.1016/j.obhdp.2012.11.003

Van Vugt, M., & Samuelson, C. D. (1999). The impact of personal metering in the anagement of a natural resource crisis: A social dilemma analysis. *Personality and Social Psychology Bulletin*, *25*(6), 735–750. https://doi.org/10.1177/0146167299025006008

World Bank. (2011a). *World governance indicators. Government effectiveness (World Bank Estimate)*. Retrieved April 23, 2020, from http://data.worldbank.org/indicator/GE.EST

World Bank. (2011b). *World governance indicators. Rule of law (World Bank Estimate)*. Retrieved April 23, 2020, from http://data.worldbank.org/indicator/RL.EST

Yamagishi, T. (1988). The provision of a sanctioning system in the United States and Japan. *Social Psychology Quarterly*, *51*(3), 265–271. https://doi.org/10.2307/2786924

Yamagishi, T., Cook, K. S., & Watabe, M. (1998). Uncertainty, trust, and commitment formation in the United States and Japan. *American Journal of Sociology*, *104*(1), 165–194. https://doi.org/10.1086/210005

Yamagishi, T., Jin, N., & Miller, A. S. (1998). In-group bias and culture of collectivism. *Asian Journal Of Social Psychology*, *1*(3), 315–328. https://doi.org/10.1111/1467-839X.00020