Honour, Competition and Cooperation across 13 Societies

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Honour, Competition and Cooperation across 13 Societies

Shuxian Jin[1], Angelo Romano[2], Vivian L. Vignoles[1], Alexander Kirchner-Häusler[3,1], Rosa Rodríguez-Bailón[4], Susan E. Cross[5], Meral Gezici Yalçın[6], Charles Harb[7], Shenel Husnu[8], Keiko Ishii[9], Panagiota Karamaouna[10], Konstantinos Kafetsios[11,12], Evangelia Kateri[10], Juan Matamoros-Lima[4,13], Rania Miniesy[14], Jinkyung Na[15], Stefano Pagliaro[16], Charis Psaltis[17], Dina Rabie[18], Manuel Teresi[19], Yukiko Uchida[3], Ayse K. Uskul[1]

[1] School of Psychology, University of Sussex, Brighton, United Kingdom

[2] Social, Economic and Organisational Psychology Department, Leiden University, Leiden, Netherlands

[3] Institute for the Future of Human Society, Kyoto University, Kyoto, Japan

[4] Mind, Brain, and Behaviour Research Center (CIMCYC), University of Granada, Granada, Spain

[5] Department of Psychology, Iowa State University, Ames, United States

[6] Institute for Interdisciplinary Research on Conflict and Violence, Bielefeld University, Bielefeld, Germany

[7] Psychology Program, Doha Institute for Graduate Studies, Doha, Qatar

[8] Department of Psychology, Eastern Mediterranean University, Famagusta, Cyprus

[9] Department of Cognitive and Psychological Sciences, Nagoya University, Nagoya, Japan

[10] Department of Psychology, University of Crete, Rethymno, Greece

[11] School of Psychology, Aristotle University of Thessaloniki, Thessaloniki, Greece

[12] Department of Psychology, Palacký University Olomouc, Olomouc, Czech Republic

[13] Department of Social and Organizational Psychology, Faculty of Psychology, National University of Distance Education, Madrid, Spain

[14] Department of Economics, The British University in Egypt, Cairo, Egypt

[15] Department of Psychology, Sogang University, Seoul, South Korea

[16] Department of Psychology, University of Chieti-Pescara, Chieti, Italy

[17] Department of Psychology, University of Cyprus, Nicosia, Cyprus

[18] Faculty of Social Sciences, Northeastern University London, London, United Kingdom

[19] Department of Education, Cultural Heritage and Tourism, University of Macerata, Macerata, Italy

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Corresponding Authors: Dr. Shuxian Jin, School of Psychology, University of Sussex, Falmer, Brighton, BN1 9QH, United Kingdom, Email: shuxian.jin@sussex.ac.uk (ORCID ID: 0000-0003-2209-4311); Prof. Ayse K. Uskul, School of Psychology, University of Sussex, Falmer, Brighton, BN1 9QH, United Kingdom, Email: A.K.Uskul@sussex.ac.uk (ORCID ID: 0000-0001-8013-9931)

Abstract

Effectively addressing societal challenges often requires unrelated individuals to reduce conflict and successfully coordinate actions. The cultural logic of "honour" is frequently studied in relation to conflict, but its role in competition and cooperation remains underexplored. The current study investigates how perceived normative and personally endorsed honour values predict competition and cooperation behaviours. In an online experiment testing pre-registered hypotheses, 3,371 participants from 13 societies made incentivized competition decisions in a contest game and cooperation decisions for coordination in a step-level public goods game. Perceived normative honour values were associated with greater competition and also greater cooperation at both societal and individual levels. Personally endorsing values tied to defence of family reputation was associated with greater coordinative efforts, whereas endorsing self-promotion and retaliation was associated with weaker engagement in coordination. These findings highlight the role of honour as a cultural logic (in its different forms) in shaping competition and cooperation across societies.

Main Text

Social interactions frequently involve conflicts of interest between individuals, where the actions available to individuals (e.g., competition, cooperation) and the outcomes they might receive (e.g., zero-sum, positive-sum) can vary extensively[1–3]. For instance, in formally structured contests where individuals compete for status or limited resources, the outcomes can be zero-sum – meaning a gain for one party directly translates into a loss for another[4]. In contrast, situations where individuals coordinate to achieve a common good at a personal cost often involve positive-sum outcomes, where the collective gain for all parties exceeds what any one of them could achieve independently[5]. Understanding these different types of interactions is essential for addressing societal challenges, such as mitigating conflict and fostering efficient coordination among unrelated members of society.

Past literature has taken different perspectives on studying competition and cooperation. Some research categorizes these behaviours as representing two extremes of a singular behavioural spectrum[4,6], while others consider them as entwined components harmoniously coexisting or even being positively related in conflicting-interest situations[7–9]. Empirical research has increasingly investigated when and why individuals compete and/or cooperate with others, though largely in separate studies, both within and across cultural contexts[10–15]. Recent cross-cultural research, containing evidence from non-Western regions, investigated a range of ecological, social, and institutional factors that may account for cross-cultural variation in competition and/or cooperation[13,16,17]. *Honour*, a relevant yet underexplored cultural concept, is particularly prevalent in certain non-Western regions (e.g., the Middle Eastern and North African societies)[18–21], and may act as an important cultural logic shaping how individuals navigate conflicts of interest between the self and others.

Honour can be understood as the value of a person in their own eyes and in the eyes of others[22]. To be honourable, individuals must actively express certain traits or behaviours to

claim honour and gain recognition and respect from others in their social environment[23–25]. Recently, honour has been studied as a cultural logic comprising shared beliefs, values, norms, and practices that cohere around the central theme of pursuing honour[26]. This cultural logic tends to emerge in harsh, competitive environments characterized by status inequality and instability, and historically weak institutions[27–29]. In these environments, individuals likely develop strategies to protect their safety and resources, as well as those of their close ingroups such as family members, through personal actions. A reputation for toughness and strength is adaptive because it can deter competitors and prevent being exploited in the future[26,28,30]. Individuals' willingness to retaliate or even preemptively defend themselves, securing a tough reputation, can be selected as an important survival strategy and thus become normative in these environments[31]. Moreover, individuals may engage in similar actions to defend the honour of their close others or affiliated social groups (e.g., typically family members)[32]. However, the pursuit of honour seems to risk escalating unnecessary conflict, especially among unrelated individuals. Past literature has documented that honour-related norms and behaviours can foster conflict responses such as violence, aggression and honour-related crimes[28,33–36].

To study how the cultural logic of honour may shape both competition and cooperation, we employed two separate incentivized economic games that may provide different opportunities for the expression of honour-related values and norms[37,38]. Economic games are highly structured situations with formal rules and unambiguous outcomes, which are nonetheless widely used to study human judgement, decision-making and behavioural choices that may transfer into everyday life[37,39]. We examined how individuals' behaviour in these games may be predicted by honour values on multiple levels: societal-level variation in honour culture (i.e., effects of living in societies where honour values are more or less prevalent)[40], individual-level variation in perceived societal honour norms (i.e., effects of

perceiving honour values as more or less normative in one's society—also known as "intersubjective culture")[21,41,42], and individual-level variation in personal honour values (i.e., effects of personally internalizing cultural values of honour more or less)[26].

Contest games are formally structured conflict situations in which one can only be better off at the cost of the other, and one risks being exploited if losing to one's opponent[43,44]. These games have been used to study informal and formal types of competition, as they model conflict situations that result in zero-sum outcomes (e.g., public debates, sports competitions, leadership elections). In societies more strongly characterized by a cultural logic of honour, competition can serve as an important means for achieving or maintaining honour, while failure to compete may be perceived as a sign of weakness, leading to potential losses of reputation and social status for individuals (and their close associates, such as family members)[45,46]. Thus, we expected that members of societies where honour values are more prevalent would exhibit higher levels of competition (*H1a*) and expectations about interpersonal competition (*H1b*). At the individual level, we hypothesized that the more individuals perceive honour values as being societally prevalent, the more likely they may engage in competitive actions themselves (*H2a*), and expect unrelated others to adopt similar strategies, expressing toughness and competing to promote oneself or prevent losing resources (*H2b*). Moreover, individuals who more strongly endorse honour values may be more likely to adopt strategies expressing strength and toughness in front of others by engaging in more competitive actions (*H3*)[47].

Step-level public goods games (PGG) model situations where individuals can cooperate to achieve better collective outcomes at the risk of wasting personal efforts if coordination fails (e.g., building a neighbourhood security system or communal infrastructure)[3,5]. Compared to continuous PGGs, the step-level form transforms the cooperation game into a social coordination problem that aligns self-interests more closely

with collective interests and increases the likelihood of cooperation[15]. Investing in coordinating the successful provision of a public good does not necessarily signify weakness. Unlike contest games where one can only benefit by imposing a cost on others, step-level PGGs give individuals the choice between extending benefits to others at a personal cost or refraining from doing so[48]. The latter enables individuals to express their benevolence, generosity, hospitality, and politeness, which may enhance their own honour and that of their close ingroup[26,30,49,50]. However, the inherent risk of wasting coordinative efforts may place individuals in a "sucker's situation" if others do not cooperate, potentially suggesting a negative link between honour and cooperation[51,52]. We therefore did not formulate specific hypotheses but explored the relationship between honour and cooperation.

The experiment reported here involved a sample of 3,371 participants stratified by age and gender from 13 societies (see Table 1 and Table S35 for more demographic information) to test our pre-registered hypotheses (https://osf.io/r9atc) and examine further research questions about how perceived normative and personally endorsed honour values relate to competition and cooperation. Participants were recruited online through panel agencies and local research companies (see Methods). Nine of the 13 societies—Spain, Italy, Greece, Turkey, Cyprus (both Greek Cypriot and Turkish Cypriot communities), Lebanon, Egypt, and Morocco—were in the Mediterranean region, where recent findings have shown that honour values are deeply ingrained in individuals' social worlds, albeit in different forms and to a greater extent in societies further East and/or South within this region[21]. Participants made 12 independent rounds of decisions in two economic games (six rounds per game). Each round was played with a different participant from participants' own society, whose decision was asynchronously paired after the experiment for payment calculation. We studied interactions among unrelated individuals from the same society to avoid confounding our outcomes with competitiveness between societal ingroup (citizens) and outgroup members (foreigners)[17].

Table 1. Summary of descriptives.

Society	*N*	Language	% Females	M_{age} (*SD*)	% Comp (E)	% Coor (E)	PNH (O)	PNH (F)
Egypt	270	Arabic	50.38	40.78 (14.00)	69.45 (60.20)	66.54 (62.20)	6.03	0.41
Greece	255	Greek	49.61	40.59 (13.76)	64.86 (57.25)	64.15 (60.41)	5.29	0.19
Greek Cypriot community	269	Greek	50.93	41.22 (14.20)	65.72 (59.55)	64.13 (62.88)	5.35	0.48
Italy	270	Italian	50.37	41.14 (14.21)	62.34 (57.42)	62.57 (60.75)	5.04	-0.09
Japan	261	Japanese	49.23	41.56 (14.91)	64.12 (57.09)	57.06 (56.44)	4.50	-0.34
Lebanon	250	Arabic	53.01	39.25 (12.83)	61.17 (50.36)	59.69 (56.84)	5.64	-0.08
Morocco	260	Arabic	49.22	39.81 (13.15)	67.66 (59.25)	63.71 (59.56)	5.66	0.55
South Korea	271	Korean	49.82	41.21 (14.61)	62.00 (55.50)	60.13 (60.06)	4.89	0.05
Spain	249	Spanish	48.19	40.81 (14.30)	62.76 (54.73)	61.55 (58.20)	4.98	-0.16
Turkish Cypriot community	245	Turkish	49.80	40.32 (14.46)	59.42 (57.61)	59.62 (59.62)	5.05	0.17
Türkiye	260	Turkish	50.77	40.72 (14.01)	67.62 (61.79)	66.66 (64.45)	5.50	0.15
United Kingdom	255	English	49.80	41.47 (15.79)	62.51 (55.69)	60.95 (56.14)	4.45	-0.60
United States	256	English	51.01	41.33 (16.25)	62.22 (55.68)	61.42 (57.77)	4.44	-0.72
Total	**3,371**	/	**50.16**	**40.79 (14.36)**	**64.03 (57.13)**	**62.20 (59.68)**	**5.14**	/

Note. *N* = sample size, M_{age} (*SD*) = mean age (standard deviation), % Comp (E) = percentage of competitive investments (percentage of expectations of other's competitive investments), % Coop (E) = percentage of cooperative investments (percentage of expectations of other's cooperative investments), PNH (O) = societal mean of perceived normative honour values, PNH (F) = factor score of perceived normative honour values. See Table S35 for more summary information on the age range, parents' education level, subjective social status, ethnicity, and living environment (e.g., urban, rural) of the sample from each society.

Competition was measured in a contest game where participants could invest their money attempting to take away their opponent's money (see Fig. 1)[43,44]. If a participant invested more than their opponent, they could take all the money that the opponent did not invest; if both participants invested the same amount (i.e., tie), they would each keep whatever money they had not invested. Cooperation was measured in a coordination game: a step-level PGG with two provision levels (16 and 12 monetary units, MUs) where participants could attempt to reach the provision levels of the public good by contributing money that would be combined with their partner's contributions (see Fig. 1)[53]. A compelling decision rule, potentially rooted in concepts of equity and fairness, is to equally share the cost to meet a provision point (e.g., contributing 8 or 6 MUs). Such decisions are often referred to as *focal points* in coordination games, and the frequency with which individuals make these decisions can reflect their coordinative efforts[5]. After each decision in both games, we asked

participants to indicate their beliefs about their partner's decision, which we used to test *H1b* and *H2b* as well as to define further outcomes for exploratory analyses (see Fig. 3 and Methods).

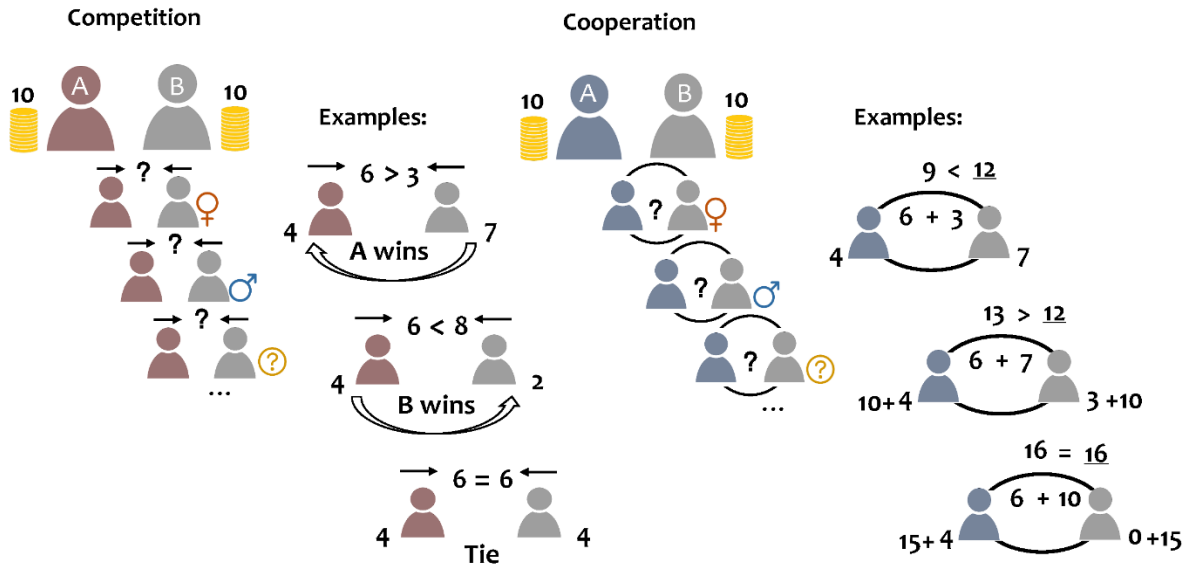

Fig. 1 | Summary of the design. In the contest game, participants (red avatar) invested money to attempt to take away the money from their game partner (competition decisions). All invested money would be lost. If a participant invested more than their partner, they could take all the money that their game partner did not invest. However, if both participants invested the same amount, they would each keep whatever money they had not invested. In the step-level public goods game, participants (blue avatar) invested money (together with their game partner's investment) to attempt to reach the provision points of the public good (cooperation decisions). The total amount invested by both participants was summed and compared to two provision points. If the total investment reached the first provision point of 12 MUs, each participant would receive 10 MUs plus any money they had not invested. If the total investment reached the second provision point of 16 MUs, each participant would receive 15 MUs plus any money they had not invested. In each round, participants faced a different game partner from the same society, with manipulated gender information (male, female, or not provided). After data collection, participants' decisions were asynchronously matched with another participant's decisions, based on the manipulated gender information, to compute game payments without deception (see also Methods).

Here, we assessed both individual and family (i.e., close ingroup) facets of honour because these two facets may have different implications for social interactions within the cultural logic of honour. Specifically, our measure of individual honour focused on valuing certain traits and actions (e.g., self-promotion, retaliation) to claim honour, whereas our measure of family honour mainly focused on protecting and defending the family's

reputation[21,54]. Compared to the family facet, individual honour may be theoretically more relevant for shaping decisions in the dyadic interactions captured in the current study. However, empirical research into the implications of family honour remains limited so far. We sought to contribute to this literature by testing whether the degree to which individuals value defending the honour shared by their family shapes their interactions with unrelated others in their society.

We operationalized the cultural logic of honour through the individual-level measures of personal endorsement of the abovementioned two facets of honour values (referred to as *personal values*) as well as intersubjective perceptions of how prevalent the two facets of honour values are within each society (referred to as *perceived normative values*)[41,42]. The society mean of perceived normative honour values across both facets was used to construct a societal-level indicator, characterizing the extent to which a society can be considered a culture of honour (referred to as *societal-level honour*), ranging in our current samples from 4.44 (United States) to 6.03 (Egypt) (see Table 1 for scores of all samples). As pre-registered, we measured additional variables at the individual level, including beliefs in a zero-sum game[55] and relational mobility[56], and obtained society means to construct societal-level indicators for these variables. These variables may offer additional explanations for competition and cooperation, respectively, and have been shown to vary cross-culturally (see Methods and Section 3.2.5 and 3.3.5 in the Supplementary Information, SI, for more details).

The results revealed that perceived normative honour values were positively associated with competition, cooperation, and expectations of these behaviours from others, at both societal and individual levels. Further analyses revealed that perceived normative honour values, particularly defence of family reputation, were positively associated with coordinative decisions, anticipation of successful coordination, and willingness to engage in conditional cooperation. Regarding personal honour values, defence of family reputation

values were linked to increased cooperative and coordinative efforts, whereas self-promotion and retaliation values were associated with reduced efforts in these behaviours.

Results

Competition and cooperation

We observed significant differences across societies in competition and cooperation, with between-society variance significantly different from zero for competition, χ^2 (1) = 31.30, $p < .001$, and cooperation, χ^2 (1) = 39.80, $p < .001$ (see Table S3). Consistent with previous findings that competition and cooperation are not bipolar opposites[7,8], we found that competition and cooperation were positively associated both at the societal-level (standardized regression coefficient: $\beta_{\text{predicting competition}} = 0.11$, $t(11) = 3.95$, $p = .002$, 95% Confidence Intervals (CI) = [0.05, 0.17]; $\beta_{\text{predicting cooperation}} = 0.12$, $t(11) = 3.97$, $p = .002$, 95% CI = [0.05, 0.18]) and at the individual-level ($\beta_{\text{predicting competition}} = 0.58$, $t(3354) = 41.51$, $p < .001$, 95% CI = [0.55, 0.61]; $\beta_{\text{predicting cooperation}} = 0.57$, $t(3354) = 41.51$, $p < .001$, 95% CI = [0.55, 0.60], see Table S4 and Fig. S1).

Honour and competition

Across 13 societies, societal-level honour was associated with greater competition (*H1a*: $\beta = 0.07$, $t(11) = 2.56$, $p = .027$, 95% CI = [0.01, 0.13], see Table S5 and Fig. 2a), but not necessarily higher expectations about others' competition (*H1b*: $\beta = 0.04$, $t(11) = 1.10$, $p = .294$, 95% CI = [−0.04, 0.11], see Table S6). At the individual level, perceived normative honour values of self-promotion and retaliation (SPR), as well as defence of family reputation (DFR), were related to higher levels of competition (mixed-effects regression controlling for societal-level honour, partner gender, participant gender, age, and game order; *H2a*: $\beta = 0.05$, $t(3351) = 2.59$, $p = .010$, 95% CI = [0.01, 0.08] (SPR); $\beta = 0.07$, $t(3351) = 3.45$, $p = .001$, 95% CI = [0.03, 0.11] (DFR); see Table S5), and increased expectations of other's competition (*H2b*: $\beta = 0.04$, $t(3351) = 2.11$, $p = .035$, 95% CI = [0.003, 0.07] (SPR); $\beta = 0.07$,

$t(3351) = 3.39$, $p = .001$, 95% CI = [0.03, 0.10] (DFR), see Table S6). Individual-level measures of personal honour values across both facets were not associated with engagement in competitive behaviour (*H3*: $\beta = -0.03$, $t(3351) = -1.45$, $p = .146$, 95% CI = [−0.06, 0.01] (SPR); $\beta = 0.02$, $t(3351) = 1.15$, $p = .251$, 95% CI = [−0.02, 0.06] (DFR); see Table S5). Robustness checks using factor scores of honour values confirmed the results above, with the addition that the positive association between perceived normative honour values of self-promotion and retaliation and expectations of others' competition became nonsignificant (Table S7-S8).

Next, we explored the potential interaction between individual-level personal honour values and societal-level honour, as the implications of personally endorsing honour values could differ according to the broader cultural logic in one's society. Indeed, we observed a complex pattern for personal values related to the defence of family reputation ($\beta = -0.03$, $t(3349) = -2.08$, $p = .038$, 95% CI = [−0.07, −0.002]), but no significant interaction for self-promotion and retaliation ($\beta = 0.01$, $t(3349) = 0.83$, $p = .409$, 95% CI = [−0.02, 0.04], see Table S9). Specifically, the relationship between personal values of defending family reputation and competition was positive in societies with lower societal-level honour but became nonsignificant as society-level honour increased (see Fig. S2 for simple slope analyses). We also explored whether individuals with the same level of perceived normative and personally endorsed honour values, but inhabiting societies with differing societal-level honour, would differ in their engagement in competition and expectations of other's competition, but found no support for these contextual effects (competition: $\beta = 0.02$, $t(13) = 0.64$, $p = .533$, 95% CI = [−0.04, 0.08]; expectation: $\beta = -0.01$, $t(12) = -0.20$, $p = .843$, 95% CI = [−0.08, 0.07]; see Table S10).

Following the preregistered analysis plan, we tested beliefs in a zero-sum game as a potential additional explanation for competition. Societal mean beliefs in a zero-sum game

explained no significant variation in competition beyond societal-level honour (β = −0.03, $t(8) = -0.87$, $p = .411$, 95% CI = [−0.12, 0.06]), and individual-level beliefs in a zero-sum game explained no significant variation beyond personal and perceived normative honour values (β = −0.001, $t(2841) = -0.07$, $p = .946$, 95% CI = [−0.03, 0.03], see Table S11). These results were replicated using factor scores of honour values and beliefs in a zero-sum game (see Table S12). Further exploration of other societal-level indicators theoretically relevant to the cultural logic of honour in relation to competition can be found in Section 3.2.6 in the SI (see Table S13-S14).

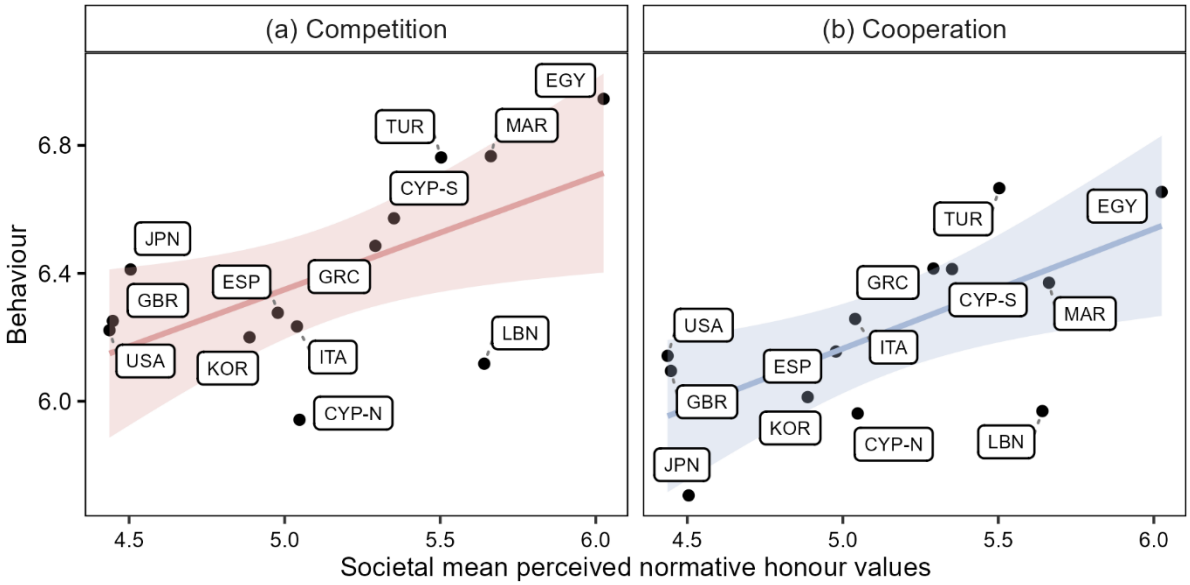

Fig. 2 | The relation between societal-level honour (i.e., societal mean perceived normative honour values), (a) competition, and (b) cooperation. Each graph was obtained by regressing the competition or cooperation behaviour on the societal mean perceived normative honour values. Dots represented society level means and were labelled by country iso code 3 (see Table S35). CYP-N represented the Turkish Cypriot community and CYP-S represented the Greek Cypriot community. The shaded area indicates the 95% CI. Societal mean perceived normative honour values (referred to as societal-level honour) was significantly and positively associated with competition (*H1a*: β = .07, $p = .027$), and surprisingly, also cooperation behaviour (β = .08, $p = .013$).

Honour and cooperation

Societies characterized by higher mean perceived normative honour values showed higher levels of cooperation (β = 0.08, $t(11) = 2.97$, $p = .013$, 95% CI = [0.02, 0.14], see Table S15 and Fig. 2b) and expectations of interpersonal cooperation (β = 0.07, $t(11) = 2.49$,

p = .030, 95% CI = [0.01, 0.13], see Table S16). At the individual level, perceived normative values of self-promotion and retaliation predicted more cooperation (β = 0.05, t(3351) = 2.78, p = .005, 95% CI = [0.01, 0.08], see Table S15), although they were not associated with expectations of other's cooperation (β = 0.03, t(3351) = 1.91, p = .056, 95% CI = [−0.001, 0.07], see Table S16). Perceived normative values of defence of family reputation predicted greater expectation of other's cooperation (β = 0.07, t(3351) = 3.76, p < .001, 95% CI = [0.03, 0.11], see Table S16), but were not associated with own cooperation (β = 0.03, t(3351) = 1.62, p = .105, 95% CI = [−0.01, 0.07], see Table S15). The two facets of personal honour values showed more complex patterns depending on society-level honour values. Overall, personal values of defence of family reputation positively predicted cooperation (β = 0.06, t(3351) = 3.00, p = .003, 95% CI = [0.02, 0.09], see Table S15); this positive association was stronger in societies with lower societal-level honour, becoming nonsignificant as societal-level honour increased (β = −0.04, t(3349) = −2.54, p = .011, 95% CI = [−0.07, −0.01], see Table S19 and Fig. S3 for simple slope analyses). Personal values of self-promotion and retaliation did not predict cooperation overall (β = −0.02, t(3351) = −0.95, p = .342, 95% CI = [−0.05, 0.02], see Table S15), but their relationship was negative among societies with lower societal-level honour, becoming weaker or even positive as societal-level honour increased (β = 0.04, t(3349) = 2.67, p = .008, 95% CI = [0.01, 0.07], see Table S19 and Fig. S3). Results were similar when using factor scores for honour values (see Table S17-S19).

We then explored whether individuals with the same level of perceived normative and personally endorsed honour values, but inhabiting societies with higher societal-level honour, would differ in their engagement in cooperation and expectations of other's cooperation, but found no support for these contextual effects (cooperation: β = 0.03, t(12) = 1.02, p = .327, 95% CI = [−0.03, 0.09]; expectation: β = 0.02, t(13) = 0.69, p = .506, 95% CI = [−0.04, 0.07], see Table S20). As pre-registered, we tested relational mobility as a potential additional

explanation for cooperation. Societal mean relational mobility did account for additional variation in cooperation beyond societal-level honour (β = 0.06, $t(10) = 2.64$, $p = .025$, 95% CI = [0.01, 0.10], see Table S21), and individual-level relational mobility positively predicted cooperation beyond personal and perceived normative honour values (β = 0.03, $t(3350) = 2.38$, $p = .017$, 95% CI = [0.01, 0.06], see Table S21). Yet, these results were not replicated using factor scores of honour values and relational mobility (see Table S22). Importantly, interpretations of societal-level patterns from the model containing both societal-level honour and societal-level relational mobility as predictors should be made cautiously, given the relatively small number of societies ($N_{society} = 13$), which may have limited the statistical power and generalizability of these findings[57]. Further exploration of other societal-level indicators in relation to cooperation can be found in Section 3.3.6 in the SI (see Table S23).

As pre-registered, we conducted secondary analyses of existing meta-analytic and empirical datasets that measured cooperation using prisoner's dilemmas (PD) and continuous PGGs. In these situations, non-cooperation can always yield the best outcome for an individual regardless of what others do. We used societal mean perceived normative honour values retrieved from Study 2 of recent research[21] to predict a) study-level mean cooperation[13] in a meta-regression, and b) individual-level cooperation[16] in mixed-effects models, using data retrieved from previous studies (see Section 3.3.7 in the SI for more information). Results showed that societal-level honour did not predict either study-level cooperation rates ($B = 0.06$, $t(1151) = 0.70$, $p = .487$, Δ pseudo $R^2 = 0\%$, see Table S24) or individual-level cooperation (β = 0.02, $t(7) = 0.39$, $p = .707$, 95% CI = [−0.11, 0.15], see Table S26).

The step-level PGG allowed us to analyse individual's willingness to coordinate by examining the focal point decisions (i.e., contributing 8 or 6 MUs). We thus explored the likelihood with which individuals made coordinative decisions to contribute exactly 8 or 6

MUs. Societal-level honour was positively associated with coordinative efforts targeting achieving efficient coordination (i.e., contributing 8 MUs) (generalized linear mixed model: *Odds Ratio* (*OR*) = 1.14, $p = .001$, 95% CI = [1.06, 1.23]), as were individual-level perceived normative honour values of defence of family reputation (*OR* = 1.30, $p < .001$, 95% CI = [1.17, 1.45], see Table S27). Conversely, personally endorsing self-promotion and retaliation was negatively associated with the likelihood of contributing 8 MUs (*OR* = 0.84, $p < .001$, 95% CI = [0.77, 0.92], see Table S27). We found no significant association between societal-level (*OR* = 0.99, $p = .841$, 95% CI = [0.94, 1.06]) or individual-level perceived normative honour values (*OR* = 1.01, $p = .785$, 95% CI = [0.94, 1.09] (SPR); *OR* = 1.05, $p = .230$, 95% CI = [0.97, 1.14] (DFR); see Table S27) and coordinative efforts targeting achieving efficient coordination (i.e., contributions of 6 MUs). However, the two facets of personal honour values showed divergent effects: self-promotion and retaliation related to lower likelihood of contributing 6 MUs (*OR* = 0.88, $p = .001$, 95% CI = [0.82, 0.95]), while defence of family reputation related to higher likelihood of contributing 6 MUs (*OR* = 1.14, $p = .002$, 95% CI = [1.05, 1.23], see Table S27). These findings remained consistent when using factor scores of honour values (see Table S28).

Exploratory analyses: Honour and behaviours adjusted by expectations

(Less-)efficient coordination success. To further shed light on the potential motives associated to the observed behavioural cooperation patterns, we compared the sum of individuals' own cooperation and expected partner's cooperation with two provision points of the public good. This allows to explore how the cultural logic of honour relates to individuals' anticipation of coordination success (see Methods). Societal-level honour positively predicted the anticipation of *efficient coordination success*, defined as the expectation of reaching the higher provision point (*OR* = 1.42, $p < .001$, 95% CI = [1.26, 1.60]), but was not associated with the anticipation of *less-efficient coordination success*,

defined as the expectation of reaching the lower but not the higher provision point (*OR* = 1.01, $p = .816$, 95% CI = [0.92, 1.11], see Table S29). At the individual-level, perceiving stronger normative values of defence of family reputation was positively associated with anticipation of less-efficient coordination (*OR* = 1.20, $p < .001$, 95% CI = [1.10, 1.32]) but not with anticipation of efficient coordination (*OR* = 1.10, $p = .270$, 95% CI = [0.93, 1.29], see Table S29). The two facets of personal honour values showed divergent patterns: defence of family reputation positively predicted anticipation of efficient coordination success (*OR* = 1.19, $p = .030$, 95% CI = [1.02, 1.39]), while self-promotion and retaliation negatively predicted anticipation of less-efficient coordination success (*OR* = 0.84, $p < .001$, 95% CI = [0.77, 0.91], see Table S29). Results were consistent when using factor scores of honour values (see Table S30).

(Less-)efficient competition. We also explored different forms of competition by subtracting expected partner's competition from individuals' own competition. This allows to distinguish different type of competitive behaviour which may have reflected different underlying motives (see Methods). Specifically, we explored how the cultural logic of honour relates to *efficient competition* (defined as spending just enough to win) and *less-efficient competition* (defined as overspending to make sure they win). At the individual level, stronger perceived normative values of self-promotion and retaliation consistently predicted more occurrence of efficient competition (*OR* = 1.11, $p = .012$, 95% CI = [1.02, 1.21]), but not less-efficient competition (*OR* = 0.97, $p = .497$, 95% CI = [0.88, 1.06], see Table S31). Perceived normative values of defence of family reputation did not predict the occurrence of either efficient or less-efficient competition (*OR* = 1.01, $p = .918$, 95% CI = [0.92, 1.10], see Table S31). These findings remained consistent when using factor scores of honour values (see Table S32). However, we found no consistent evidence for an association between societal-level honour (or personal honour values) and the occurrence of either efficient or

less-efficient competition using observed scores and factor scores of honour values (see Table S31-S32).

(Un)conditional cooperation. By subtracting expected partner's cooperation from individuals' own cooperation, we also distinguished different types of cooperative behaviour (see Methods), and explored how the cultural logic of honour relates to *conditional cooperation* (defined as matching the expected contribution of one's partner in the same round) and *unconditional cooperation* (defined as exceeding the expected contribution of one's partner in the same round). At the individual level, perceiving honour values of defence of family reputation as more prevalent in one's society consistently positively predicted the occurrence of conditional cooperation (OR = 1.10, p = .043, 95% CI = [1.00, 1.20]), but negatively predicted unconditional cooperation (OR = 0.82, p < .001, 95% CI = [0.73, 0.91], see Table S33). These findings were consistent when using factor scores of honour values (see Table S34). However, we found no evidence for the association between societal-level honour (or individual-level honour indicators: perceived normative values of self-promotion and retaliation, personal honour values for both facets) and the occurrence of either conditional or unconditional cooperation using observed scores and factor scores of honour values (see Table S33-S34).

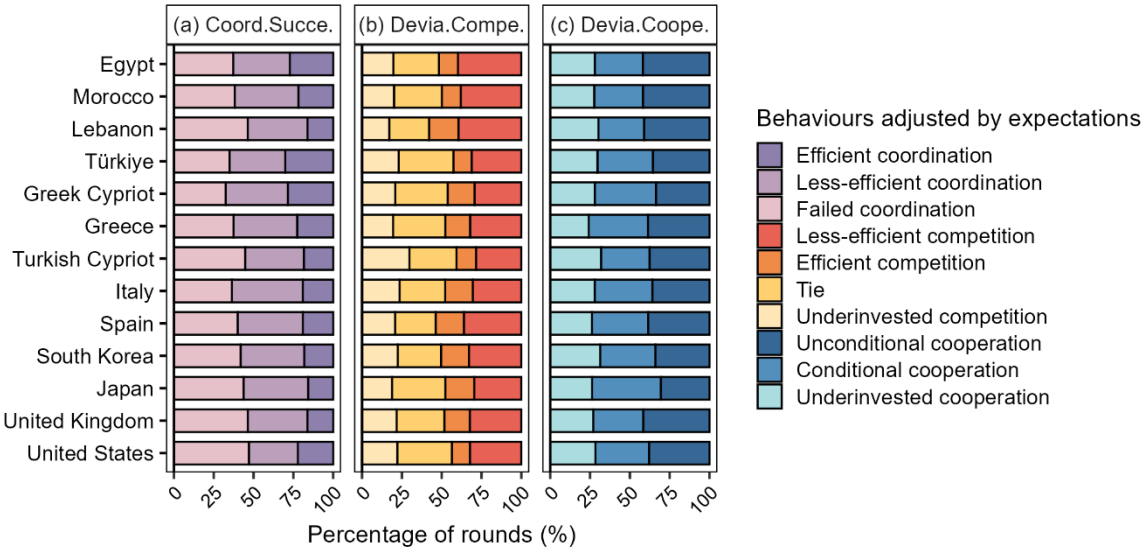

Fig. 3 | Percentage of rounds for each type of (a) anticipation of coordination success and behavioural deviation from expectations for (b) competition and (c) cooperation. (**a**) The sum of an individual's own contribution and expected contribution from the other in a given round in the step-level PGG were grouped into three categories, where *failed coordination* indicates that the sum contribution did not reach the first provision point (i.e., 12 MUs), *less-efficient coordination* indicates that the sum contribution only reached the first provision point but not the second one (i.e., 16 MUs), and efficient coordination indicates that the sum contribution reached the second provision point. (**b**) In the contest game, the deviations of an individual's own competition from their expected competition from the other in a given round were grouped into four categories, where *underinvested competition* indicates that the individual's own competition was less than expected competition from the other, *tie* indicates that the individual competed exactly the same level as the expected level from the other, *efficient competition* indicates that the individual's own competition was just one MU more than the expected competition from the other, *less-efficient competition* indicates that the individual's own competition was at least two MUs more than the expected competition from the other. (**c**) In the step-level PGG, the deviations of an individual's own contribution from their expected contribution from the other in a given round were grouped into three categories, where *underinvested cooperation* indicates that the individual's own contribution was less than expected contribution from the other, *conditional cooperation* indicated that the individual contributed exactly the same level as the expected level from the other, and *unconditional cooperation* indicates that the individual's own contribution was more than the expected contribution from the other. Societies were sorted in ascending order according to societal-level honour (i.e., the societal mean of perceived normative honour values), from the bottom upwards on the y-axis.

Discussion

Our online experiment tested hypotheses and research questions about the role of honour values in competition, cooperation, and expectations of these behaviours from unrelated others, at both societal and individual levels, across 13 societies. The study incorporated a multi-faceted and multi-layered examination of honour values and norms, thereby providing a test of how the cultural logic of honour may shape competition and cooperation. As predicted, members of societies where honour values were more prevalent exhibited greater interpersonal competition (supporting *H1a*), but they did not show correspondingly higher expectations of competition from others in our main analyses (no support for *H1b*). Individuals who perceived honour values as more prevalent in their society also competed more (supporting *H2a*) and expected greater competition from others (supporting *H2b*). Personal honour values were not associated with competition (no support for *H3*). Similar patterns were observed for cooperation, with both societal mean and

individual perceived normative honour values positively associated with cooperation and expectations of other's cooperation (see Table 2 for a summary of main findings).

Table 2. Support for hypotheses and summary of main findings

Predictor	Outcome	Competition			Cooperation
		Hy.	Direction	Support	Direction
Societal-level honour	Behaviour	*H1a*	+*	Y	+*
	Expectation	*H1b*	+	N	+*
Individual-level honour					
Perceived normative honour values					
Self-promotion and retaliation	Behaviour	*H2a*	+*	Y	+**
Defence of family reputation			+**	Y	+
Self-promotion and retaliation	Expectation	*H2b*	+*	Y	+
Defence of family reputation			+**	Y	+***
Personal honour values					
Self-promotion and retaliation	Behaviour	*H3*	−	N	−
Defence of family reputation			+	N	+**
Cross-level interactions					
Personal honour (SPR) × Societal-level honour	Behaviour		/	+	/	+**
Personal honour (DFR) × Societal-level honour			/	−*	/	−*
Contextual effects	Behaviour		/	+	/	+
	Expectation		/	−	/	+

Note. Hy. = number of hypotheses, −/+ = direction of the effect, Y = hypothesis supported, N = hypothesis not supported (nonsignificant results). The contextual effects describe the differences in competition (or cooperation) among participants who have the same level of perceived normative and personal honour values but live in societies with different societal-level honour. The "Support" column is missing for cooperation as no hypothesis was preregistered. * $p < .05$, ** $p < .01$, *** $p < .001$

Our hypotheses and analyses were informed by the cultural logics framework which conceptualizes honour as a cultural syndrome involving a set of coherent shared beliefs, values, behaviours, and practices[26]. The positive association between perceived normative honour values and competition at both societal and individual levels aligns with characterisations of pre-emptive defence as an important strategy in social interactions under the cultural logic of honour[20,34,58–61], and with previous research on conflict and negotiation showing higher competitive aspirations in negotiations among individuals from honour, compared to non-honour cultural backgrounds[45]. Interestingly, exploratory analyses suggested that individuals who perceived stronger normative values of self-promotion and retaliation may aim to minimize the cost of winning a contest, rather than engage in excessive

competitive spending that could diminish their welfare after winning. This finding challenges claims in the literature linking honour with abhorring cost-benefit calculations[26]. When competition is institutionalized with clearly defined incentive structure, such conditions afford honour-related norms to manifest in efforts to compete efficiently, based on expectations of the other's competition.

Beyond the conflict situation that constrained individuals to compete or not, the present study also employed a social coordination situation that afforded the possibility of working together to increase welfare. The positive association between perceived normative honour values and cooperation—including evidence from levels of cooperation, coordinative decisions targeting achieving efficient coordination (e.g., contributing 8 MUs), and anticipation of coordination success—both at societal and individual levels, aligns with earlier research on honour cultures and conflict management. This research found that individuals from honour, compared to non-honour, cultures were more willing and able to handle conflict situations constructively, and made more cooperative offers in negotiations when the situation afforded such opportunities — such as in the absence of insults[59], or in the presence of social rewards[49]. Moreover, exploratory analyses that subtracted expectations of others' cooperation from one's own suggested that individuals who perceived stronger normative values of defence family reputation may be more likely to condition their own cooperation on the expected cooperation of others, but less likely to respond altruistically to expected less-cooperative others. These findings provided empirical support for the theorised importance of positive reciprocal principles and self-protection to avoid being exploited in social interactions within the cultural logic of honour[26].

We observed a positive association between competition and cooperation at both the societal and individual levels, which supports the perspective that these two processes are not mutually exclusive but coexist[7,8]. Research increasingly found competition and cooperation

to co-occur for the same individuals in group activities[62], and across domains such as business[63] and politics[64]. Similarly, recent evolutionary models that investigated competition and cooperation as independent components have demonstrated the joint evolution of these behaviours[48]. Moreover, our findings suggested that competition and cooperation can coexist within the cultural logic of honour. This aligns with previous research that found self-reliance and group-oriented interdependence to coexist in societies where honour is a central cultural value[65] and to be associated with competition and cooperation[66,67]. Our findings suggest that the ecologies fostering the cultural logic of honour may also promote the co-emergence of competition and cooperation.

Our study provides multi-layered evidence by examining the cultural logic of honour from subjective endorsement of cultural values to intersubjective perceptions of normative values in one's society, and further extending to societal-level cultural phenomenon[40,41,54,68]. Compared to personal values, perceived normative honour values played a stronger and more robust role in predicting both individuals' behaviours and their expectations of others' behaviours in situations involving a conflict of interest. Aggregating these intersubjective perceptions to societal-level means as a cultural indicator largely replicated findings observed from individual-level perceived normative honour values. We further decomposed the societal-level effects into contextual and individual-level effects, but found no evidence for contextual effects. This suggests that cultural contexts characterized by varying levels of honour value prevalence may shape interpersonal competition and cooperation primarily through individuals' perceptions of the prescribed values and norms within these contexts. Additionally, findings from cross-level interactions showed that personal honour values were more predictive of competition and cooperation in societies with lower societal-level honour. This suggests that weaker societal pressure to adhere to honour norms may amplify the role of personal honour values in shaping behaviours. Taken together, these findings highlight the

importance of examining the cultural logic of honour as a set of normative values that individuals inhabiting different cultural contexts perceive and respond to, and of considering the affordances cultural contexts provide when testing the role of individual's personal beliefs or values in predicting their behaviours[41,69].

Our analyses revealed contrasting roles of two facets of personal honour values in relation to cooperation. Specifically, the value placed on defence of family reputation was associated with increased cooperative and coordinative efforts (the latter was particularly evidenced by more frequent decisions of equally splitting the cost to achieve successful coordination in the step-level PGG), whereas the value placed on self-promotion and retaliation was linked to reduced efforts in the same behaviours. Divergent mechanisms also emerged for the two facets of honour when examining the cross-level interactions in predicting cooperation. In societies with lower (vs. higher) societal-level honour, personally endorsing self-promotion and retaliation was found to hinder cooperation, while personally endorsing defence of family reputation played a positive role in fostering cooperation. One possible explanation lies in the interdependent and coordinative nature of family honour—a family's honour is maintained by members working together to uphold their family's reputation and prevent any damage to it in the surrounding environment[30]. However, it remains unclear why this family honour-oriented coordination motive extended beyond close ingroup boundaries to also benefit unrelated others within the same society (in the absence of any outgroup from other societies). Future research could examine personal values of defending the honour of larger ingroups beyond the family to determine whether the same patterns hold at varying levels of group boundaries.

We used incentivized economic games to capture participants' actual behaviours (i.e., beyond hypothetical situations and questionnaire self-reports) as well as their incentivized expectations about other's behaviours. This approach introduces real consequences for

individuals if their reported behaviour does not align with true preferences[39]. By altering the formal rules of the game, structural variations were applied to study specific types of situations[15]. For instance, the distinct separation between the contest game and the step-level PGG helped avoid ambiguity in operationalizing competitive and cooperative behaviours[7]. As evidenced by findings from reanalysis of previous datasets, step-level PGGs may be more suitable for measuring cooperation, compared to PDs and continuous PGGs[13,16], as the strong appeal of non-cooperation to self-interest in the latter two may limit the expression of the cultural logic of honour in the manifestation of cooperation.

While past research has shown the ecological validity of behaviours measured in economic games[70–73], these insights may not generalize to all social settings[74]. In everyday life, competition (and cooperation) involved in honour-claiming or protecting behaviours may not adhere to formal rules or have an explicit incentive structure to determine winners and losers (provision points of public goods)[75]. Real-life cases of competition may sometimes result in mutual development rather than zero-sum outcomes[9]. Future research could employ methods such as experience sampling to explore the role of honour in shaping spontaneous competition and cooperation in daily social interactions. A further potential methodological limitation is that both competition and cooperation were measured as proactively deciding to invest resources. This approach may introduce confounds to the covariation of competition and cooperation with honour due to a general tendency among individuals to invest monetary units (MUs) into the (challenge/common) pool. On the other hand, this controlled for the potential framing effects that could arise if cooperation were operationalized as "give-some" behaviour (i.e., investing resources) and competition as "keep-some" behaviour (i.e., refraining from investing)[76].

The current research demonstrated a positive relationship between perceived normative honour values and competition, as well as cooperation, at both societal and

individual levels across various societies. Personal values of defence of family reputation were linked to more cooperative and coordinative efforts, while self-promotion and retaliation was associated with reduced efforts in these behaviours. These findings enhance our understanding of honour as a multi-faceted and multi-layered cultural logic shaping social interactions, particularly as individuals navigate conflict and coordination challenges with unrelated others in their society.

Methods

Ethics & Inclusion. The research was approved by the Sciences & Technology Cross-Schools Research Ethics Committee (C-REC) at the University of Sussex (ER/SJ468/1). The pre-registration (registered on May 24, 2023) and materials are accessible at https://osf.io/r9atc (see Section 1 in the SI for pre-registration deviations and unregistered steps). All participants provided informed consent before completing the study on a voluntary basis.

Participants. We recruited 3,656 participants aged 18 years or older, stratified by age and gender, from 13 societies (Cyprus: both Greek and Turkish Cypriot communities, Egypt, Greece, Italy, Lebanon, Morocco, Spain, Turkey, Japan, South Korea, United Kingdom, United States of America). Several inclusion criteria were applied, resulting in the exclusion of a) 120 participants who were not born and located in the respective society, b) 24 participants who did not self-identify as male or female, c) 29 participants who failed the quality check question, and d) 112 participants who failed all four comprehension questions designed to assess participants' understanding of the contest game and step-level PGG rules. A final sample of 3,371 participants was retained for analyses (50.16% women; M_{age} = 40.79, SD_{age} = 14.36). Our sample was not stratified in terms of other demographic characteristics. The majority of participants self-identified as belonging to the majority ethnic group in the respective society (93.60%) and reported having an urban background (85.79%). Overall,

participants reported a moderate level of parental education (i.e., above high school; M = 4.33, SD = 1.58) and subjective socioeconomic status (M = 5.59, SD = 1.92, on a scale from 1 to 10; see Table S35 for more information). One of our main goals was to detect potential differences between societies in their level of competition and cooperation. A sensitivity power analysis indicated that a sample of 250 participants per society, with 80% power (α = .05), could detect an effect size of d = .25 between two societies. We thus aimed at recruiting 3,250 participants (~250 per society).Participants were recruited through an online panel provider (Toluna) including members of its third-party panel providers. As an exception, participants from Cyprus were recruited through a market research agency based in the Greek Cypriot community (CYMAR), and a research, analysis and consultancy organization based in the Turkish Cypriot community (Statica). Participants either received an email invitation or had access to the study link through the panellist portals. Only participants in the Turkish Cypriot community completed the study on a tablet provided by the research organization. Participants were compensated for their participation right after completing the survey and received additional payment based on their own and their paired game partner's decisions at the end of data collection in each society.

Procedure and experimental design. The design consisted of two counter-balanced within-participant treatments with type of game (i.e., contest game, step-level public goods game) and three randomized within-participant treatments related to the gender information of the pairing partner (i.e., male vs. female vs. gender not provided). We collected data using the software platform Qualtrics (version May 2023). The study materials were prepared in English and translated into local languages of the non-English-speaking countries following a team translation approach. Specifically, all materials were first translated by members of the research team, who are native speakers of the respective language, and then reviewed and checked for accuracy and local conventions of language use by other team members who are

fluent in both the local language and English. Whenever disagreements emerged, an additional round of discussion was used to reach a final decision. In some cases, we adjusted the wording of materials to fit locally common expressions (e.g., the translation of "challenge pool" for the contest game).

The same experimental procedure was followed in all samples. Participants were asked to make six independent rounds of decisions in the contest game, and another six rounds in the step-level public goods game. Each round involved a different game partner—either male, female, or with gender information not provided—from their own society, whose decisions were asynchronously paired with those of the participant after the experiment. Participants were asked to make decisions regarding the allocation of Monetary Units (MU) and estimate their partners' decisions. To ensure comparable payment levels, each MU was set to the monetary value of 0.1 kg flour in each society. Information on flour prices in each society was retrieved at https://www.globalproductprices.com/ in March 2023. Participants were informed about the monetary value of each MU and that their decisions in the game have monetary consequences. No deception was used in the economic games. Participants also completed several measures, including perceived normative values and personal values across the two facets of honour (i.e., self-promotion and retaliation, defence of family reputation), beliefs in a zero-sum game, and relational mobility. They were debriefed at the end of the experiment and compensated for their participation through the panel provider/research agency.

After data collection was completed, we randomly selected one out of 12 rounds of participants' decisions from the two economic games for post hoc decision pairing within each society and calculating participants' payment from the game[16,79]. The pairing of decisions was implemented based on both the participant's gender and the partner's gender information from the randomly selected round. For example, if a female participant's game

partner in the selected round was male, her decision was paired with a male participant whose game partner was female. The game payment consisted of earnings from making the decision and from making an accurate estimation of their partner's decision in the selected round. Participants received their game payment within two weeks following the conclusion of data collection.

Contest game. We applied a continuous contest game (also referred to as the rent-seeking game)[43,80] to measure individuals' own competitive behaviour and expectations of others' competition. The contest game involved two players. Each player received an endowment of 10 MUs and decided how many of the 10 MUs they wanted to invest into a challenge pool (investment = x_i, $0 \leq x_i \leq 10$) or keep for themselves. Higher investment to the challenge pool was taken as evidence of individuals engaging in higher levels of competitive behaviours. The player who has invested more to the challenge pool would win the game and receive final earnings comprising the remaining MUs that the other player did not invest plus the MUs that the player kept for themselves. In other words, the winner of the game took the remaining resources of the loser, and the loser would end up with nothing. However, if the two players invested equal MUs to the challenge pool (i.e., tie), both players would simply end up with the MUs they did not invest in the challenge pool. More formally, if π_i denotes player *i*'s payoff, then

$$\pi_i = \begin{cases} (10 - x_i) + (10 - x_j), & \text{if } x_i > x_j \text{ (i.e., } i \text{ wins)} \\ 10 - x_i, & \text{if } x_i = x_j \text{ (i.e., } i \text{ ties)} \\ 0, & \text{if } x_i < x_j \text{ (i.e., } i \text{ loses).} \end{cases}$$

Thus, the contest game is a symmetric conflict game in which each player has the possibility to increase their payoff at the expense of the other player. In this game, player *i*'s payoff would fall in the range of $0 \leq \pi_i \leq 19$ MUs. The pareto efficient outcome could be achieved if no player invested to exploit the other and both kept their initial endowment (and thereby maintain peace). However, peace is game-theoretically unstable since there is always

a temptation for one of the players to invest just one MU to the challenge pool and thereby take all the MUs of the other player in this case (see Section 5.1 in the SI for more information).

Step-level public goods game. We applied a step-level public goods game (PGG) to measure cooperation and coordination[5,53]. This step-level PGG involved two players and two provision points. Each player received an endowment of 10 MUs and decided how many of the 10 MUs they wanted to invest into a common pool (investment = x_i, $0 \leq x_i \leq 10$) or keep for themselves. Higher investment to the common pool was taken as individuals engaging in higher levels of cooperative behaviour. Both players' investment to the common pool would be lost if the total investment did not reach the first provision point of 12 MUs. If the total investment reached 12 MUs, each player could receive 10 MUs from the common pool. Moreover, if the total investment reached the second provision point of 16 MUs, each player could receive 15 MUs from the common pool. More formally, if π_i denotes player *i*'s payoff, then

$$\pi_i = \begin{cases} 10 - x_i, & \text{if} \quad x_i + x_j < 12 \\ 10 - x_i + 10, & \text{if} \quad 12 \leq x_i + x_j < 16 \\ 10 - x_i + 15, & \text{if} \quad 16 \leq x_i + x_j. \end{cases}$$

The implementation of two provision points allowed the step-level PGG to have coordinated solutions, i.e., players could possibly work together to increase their payoff through successful coordination. Player *i*'s payoff would fall in the range of $0 \leq \pi_i \leq 19$ MUs. We defined successful coordination as cases without wasteful investment (i.e., cases where $x_i + x_j \in \{0, 12, 16\}$), and efficient coordination as the case when the provision of the public good maximized joint payoffs (i.e., $x_i + x_j = 16$). Players had an incentive to make higher contributions as efficient coordination always yielded higher payoff compared to less efficient coordination (i.e., $x_i + x_j = 12$). However, it was not safe for individuals to invest to the common pool, because the first provision point of 12 MUs could not be exceeded

alone, and the second provision point of 16 MUs required high investment from both players. One could waste their own investment if the other player did not make a sufficient investment (see Section 5.2 in the SI for more information).

Expectations about other's competition and cooperation. After each competition or cooperation decision, participants were asked about their expectation of their partner's behaviour (scale 0 to 10). We incentivized these expectations using a simple belief elicitation rule. Specifically, participants earned 5 MUs if they made a correct estimation of their partner's behaviour. Participants' payoff from making an estimation π_e equaled 5 when estimation was correct, or 0 when incorrect.

Behaviours adjusted by expectations. In the step-level PGG, we also distinguished different types of anticipation of coordination success by summing up an individual's cooperation and their expectations of their game partner's cooperation. Specifically, we categorized a given round as *efficient coordination* if the expected sum contribution reached the second provision point (i.e., 16 MUs or more), as *less-efficient* coordination if it only reaches the first provision point (i.e., 12 MUs or more but fewer than 16 MUs), and otherwise as *failed coordination* (i.e., fewer than 12 MUs, see Fig. 3).

In the contest game, we distinguished different types of competition by analysing behavioural deviation from expectations, i.e., subtracting individuals' expectations of their game partners' competition from their own competition decisions. Specifically, a given round can be categorized as *underinvested competition* if the deviation of an individual's competition from expected competition of the opponent was negative (meaning that they anticipated to lose their money), as *tie* if the deviation was equal to zero MU, as *efficient competition* if the deviation was equal to one MU (because an individual could potentially win the contest game with minimal investment, thereby retaining the most remaining resources), and as *less-efficient competition* of the deviation was higher than one MU

(because any positive deviations greater than one might ensure a win but reduced the individual's overall payoff in that round, see Fig. 3).

In the step-level PGG, we distinguished different types of cooperation by analysing behavioural deviation from expectations, i.e., subtracting individuals' expectations of their game partners' cooperation from their own cooperation decisions. Specifically, we categorized a given round as *underinvested cooperation* if the deviation of an individual's own cooperation from expected cooperation of the game partner was negative (meaning that they anticipate to contribute less than their partner), as *conditional cooperation* if the deviation was zero MU (because an individual anticipate that their own level of cooperation matches with their partner's cooperation in that round), and as *unconditional cooperation* if the deviation was positive (because an individual anticipate to contribute more than their partner, rather than matching their contributions with their partner's level of cooperation, see Fig. 3).

Honour values. Participants were asked to rate ten items assessing their endorsement of two facets of honour values (defence of family reputation: e.g., "*People should not allow others to insult their family*"; self-promotion and retaliation: e.g., "*People always need to show off their power in front of their competitors*")[21,54]. Participants rated the same set of items twice: once indicating their personal honour values ("*How much do you agree or disagree with the following statements?*") and another time indicating their perceived normative honour values, i.e., perception of the extent to which most people in their society would agree or disagree with the items ("*How much would most people in your society agree or disagree with the following statements?*"). The order of these two ratings was counterbalanced across participants. Responses to items were given on a seven-point scale (1 = *strongly disagree* to 7 = *strongly agree* for personal endorsement; 1 = *most people would*

747 *strongly disagree* to 7 = *most people would strongly agree* for societal perception). Higher
748 scores indicate stronger personal honour values or perceived normative honour values.

749 **Beliefs in a zero-sum game**. Beliefs in a zero-sum game captures the generalized
750 beliefs about the nature of social relations involving completely conflicting interests[55].
751 Previous research has shown that this belief can lead to competition and conflict, and varies
752 across societies and social economic status[55,82]. To examine whether beliefs in a zero-sum
753 game explain additional variation in competition beyond what could be explained by honour
754 values, we measured this construct by asking participants to indicate the extent to which they
755 agreed with eight statements about their belief that life is conceived as a zero-sum game (e.g.,
756 "*The successes of some people are usually the failures of others*"; 1 = strongly disagree to 6 =
757 strongly agree). Higher scores indicate stronger beliefs in a zero-sum game.

758 **Relational mobility**. Relational mobility is a socio-ecological variable that represents
759 how much freedom and opportunity a society affords individuals to choose and dispose of
760 interpersonal relationships based on personal preference[56]. Past research has found higher
761 levels of cooperation in societies characterized by more flexible and fluid social relations, as
762 well as among individuals who perceive their environment as offering more opportunities to
763 establish new relationships with strangers[16]. To examine whether relational mobility explain
764 additional variation in cooperation beyond what could be explained by honour values, we
765 measured this variable by asking participants to state how well 12 statements described the
766 people in the society where they live (e.g., "*It is common for these people to have a*
767 *conversation with someone they have never met before*"; 1 = *strongly disagree* to 6 = *strongly*
768 *agree*). Higher scores indicate that people perceive their society to promote open and flexible
769 social relations.

770 **Demographic information**. Participants were also asked to indicate their age, gender,
771 country of birth, length of stay in the country of data collection, type of environment they

772 mainly lived in (urban, rural, both), ethnic background, religious background, religiosity,
773 education level of parents, and their own subjective social status in the country of residence
774 (SSS)[83]. All demographic materials were adjusted to the respective country by local
775 collaborators, ensuring that the questions assessed locally meaningful categories (e.g., the
776 category of religious background varies across countries).

777 **Other societal-level indicators**. The cultural logic of honour has been argued to
778 emerge in harsh, competitive environments characterized by high status inequality and
779 mobility, and historically weak institutions[27–29]. To operationalize the characteristics of these
780 environments, we selected a set of theoretically relevant societal-level indicators that were
781 retrievable for as many societies in the current study as possible. These included economic
782 indicators (GDP per capita, GNI, human development index, gender inequality), quality of
783 institutions indicators (government effectiveness, rule of law, stability violence, corruption
784 control, corruption perceptions index, market competitiveness), and historical and ecological
785 threats (historical prevalence of infectious disease, world risk index, exposure, vulnerability).
786 Except for the Turkish Cypriot community, these indicators were available for all societies in
787 the current study (see Table S13 for more information about the operationalization of these
788 societal-level indicators).

789 **Analytic strategy**. For societal-level hypotheses (*H1a*, *H1b*), we applied mixed-
790 effects models in which participants (level 2) and societies (level 3) were included as two
791 random intercepts, and tested societal-level honour as a fixed predictor. For individual-level
792 hypotheses (*H2a-3*), we applied mixed-effects models in which participants (level 2) and
793 societies (level 3) were included as two random intercepts to test whether perceived
794 normative values and personal values of honour relate to competition, cooperation or
795 expectations of these behaviours from others. We calculated separate indicators of each facet
796 of perceived normative honour values as well as of personal honour values, and

simultaneously included all four individual-level honour indicators as predictors into the mixed-effects model. This approach allowed us to test the roles of perceived normative values and personal values while controlling for one another, as well as to examine how each facet uniquely explained variation in behaviours and expectations. As preregistered, age and participant gender were entered to these models as control variables. We also pre-registered the inclusion of the number (i.e., order) of the randomized game rounds as a control, but were unable to retrieve this information from the Qualtrics survey due to programming constraints. To address this limitation, we instead included the order of the game and gender information of the pairing partner as additional control variables (see Table S1). Gender information of the pairing partner and order of the game were level-1 controls in the models. Individual differences variables (age, participant gender) were level-2 controls. We analysed data with *R* 4.2.1[84] (*lme4* package[85] 1.1-35.5). All significance tests were two-tailed.

For multi-item measures of individual-level honour indicators, beliefs in a zero-sum game, and relational mobility, we used observed scores, calculated as unweighted means of the respective scale items. We also generated a societal-level indicator of honour based on mean perceived normative honour values across the two facets for each society, as well as societal-level indicators of beliefs in a zero-sum game and relational mobility, based on the societal means of these variables. To ensure the robustness of our analyses, we also obtained factor scores for honour values at both the between-society and within-society levels using confirmatory factor analysis adjusting for response styles in Mplus 8.10[86] (see Section 2 in the SI for more information). Additional analytic strategies used for robustness checks and exploratory purposes were detailed in the Supplementary Information.

Data availability

The datasets generated and analysed during the current study are publicly available at https://osf.io/3dscw/.

Code availability

The code used to analyse the data is publicly available at https://osf.io/3dscw/. The R code is also provided on the Code Ocean platform (https://doi.org/10.24433/CO.9371203.v1), allowing for a straightforward reproducible run.

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Author Contributions Statement

S.J., A.K.U., A.R., and V.L.V. conceived of the project, designed the study and discussed the results. S.J. implemented the study with translation support from R.R.B., M.G.Y., C.H., S.H., K.I., P.K., K.K., E.K., J.M.L., R.M., J.N., S.P., C.P., D.R., M.T., Y.U., and A.K.U., analysed data with inputs from V.L.V. and A.K.H., and wrote the paper with inputs from A.K.U., A.R., V.L.V., A.K.H., R.R.B., S.E.C., M.G.Y., C.H., S.H., K.I., P.K., K.K., E.K., J.M.L., R.M., J.N., S.P., C.P., D.R., M.T., and Y.U. A.K.U. supervised the project. A.R. and V.L.V. contributed equally to this work.

Competing Interests Statement

The authors declare no competing interests.

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Supplementary Information for
Honour, Competition and Cooperation Across 13 Societies

Table of Contents

1. Preregistration Deviations and Unregistered Steps

Table S1. Preregistration deviations

#	Details		Original Wording	Deviation Description	Reader Impact
1	Type	Covariates; Analysis	*"Covariates such as number of rounds, gender and age will be entered to the aforementioned models as controls."*	We were unable to retrieve information about the number (i.e., order) of the randomized rounds from the Qualtrics survey due to programming constraints and could not include this variable as a control as pre-registered. Instead, variables including the order of the game and gender information of the partner were included in the model as controls.	We did not expect this deviation affecting our hypothesis testing. The inclusion of other controls, such as the order of the game and the partner's gender, ensured that key contextual variables were still accounted for in the analysis.
	Reason	Plan not possible			
	Timing	After data access			

Note. The present study has been pre-registered on OSF (https://osf.io/r9atc) before data collection. We reported preregistration deviations following the guide by Willroth and Atherton[1].

Table S2. Unregistered steps

#	Details		Original Wording	Deviation Description	Reader Impact
1	Type	Variables; Analysis	We did not pre-register the exclusion criteria.	We applied four exclusion criteria: (a) 120 participants who were not born in and currently located in the respective society; (b) 24 participants who did not self-identify as male or female. Participants were given a third gender option at the beginning of the study, and all were allowed to complete the survey and receive full compensation, including any game earnings. However, for data analysis, we only included participants who identified as male or female. This decision was made to align with our experimental design, which manipulated the gender of the game partner using binary categories (male, female, or gender not provided) to explore specific dynamics in competition and cooperation among female–female, male–male, and mixed-gender pairs. Given the scope of this manuscript, analyses of gender effects will be addressed in a separate paper; (c) 29 participants who failed the attention check question; and (d) 112 participants who failed all four comprehension questions designed to assess understanding of the contest game and step-level public goods game (PGG) rules.	This unregistered step was taken to improve the reliability of the data and the precision of the estimated associations between cultural variables and behavioural outcomes. Specifically, criterion (a) ensured that participants were embedded in the relevant cultural context; criterion (b) maintained alignment between the sample and the experimental manipulation; and criteria (c) and (d) ensured that participants were attentive and meaningfully engaged with the study.
	Timing	Before data access; During data collection			

Table S2 (continued)

#	Details		Original Wording	Deviation Description	Reader Impact
2	Type	Variables; Analysis	In the pre-registration, we did not specify whether we would use observed scores or factor scores of the predictor variables of interest (e.g., personal and perceived normative honour values, beliefs in a zero-sum game, relational mobility).	We used observed scores (e.g., unweighted means of scale items at the individual level, society means at the societal level) for hypothesis testing and exploratory analyses, while consistently using factor scores for robustness checks of these analyses. We conducted multilevel confirmatory factor analyses (CFA) to adjust for response style and obtain factor scores at both between-society level and within-society level for subsequent analyses in mixed-effects regression models (see Supplementary Section 2 for more information).	This unregistered step provided a more thorough test of the hypotheses and exploratory analyses, and also ensured the robustness of our findings.
	Timing	After data access			
3	Type	Variables; Research Q(s); Analysis	In the pre-registration, we specified that we would generate a societal-level honour using data from individual-level perceived normative honour values. However, for individual-level analyses, we did not specify whether we would use an overall indicator of perceived normative or personal honour values across both facets of honour values, or separate indicators for each facet (i.e., self-promotion and retaliation, defence of family reputation) to predict outcome variables (e.g., competition, cooperation).	For individual-level analyses, we calculated two separate indicators for each facet of perceived normative honour values as well as of personal honour values. These four individual-level indicators for perceived normative and personal honour values were then entered as predictors to the same mixed-effects models for hypotheses testing and additional analyses.	This unregistered step allowed for a more precise analysis of the relationships between perceived normative (and personal) honour values and the outcome variables. This approach prevented the dilution of specific associations that might occur with an overall score, enabling a clearer understanding of how each facet uniquely explained variations in behaviours and expectations.
	Timing	After data access			

Table S2 (continued)

#	Details		Original Wording	Deviation Description	Reader Impact
4	Type	Variables; Research Q(s); Analysis	In the pre-registration, we specified that we would test both societal and individual-level effects of honour values, with societal-level honour indicator obtained from individual-level perceived normative honour values. However, we did not pre-register the exploration of contextual effects of societal-level honour on competition, cooperation or expectations of these behaviours from unrelated others.	As an additional exploratory analysis, we applied a grand mean centring approach to the observed scores of perceived normative honour values to further decompose the between-society effects into contextual and individual-level effects. Specifically, we added societal mean perceived normative values and grand mean-centred individual perceived normative honour values (along with control variables such as participant age and gender, partner gender information, and game order) into the same model. This allowed us to examine the fixed effect of societal-level perceived normative honour values on behaviours or expectations, while controlling for individual-level perceived normative honour values — the contextual effect (see Supplementary Sections 3.2.4 and 3.3.4 for more information).	These unregistered exploratory analyses allowed us to explore unique questions about how (hypothetical) individuals with the same level of perceived normative honour values, but inhabiting in societies with different societal mean perceived normative honour values, would differ in competition, cooperation, or expectations of these behaviours from unrelated others. These findings complemented the results from our pre-registered hypotheses and research questions regarding between-society and within-society effects.
	Timing	After data access			

Table S2 (continued)

#	Details		Original Wording	Deviation Description	Reader Impact
5	Type	Research Q(s); Analysis	We did not pre-register to explore whether honour values would be associated with coordinative decisions (contributing 8 or 6 MUs), or the occurrence of different types of anticipated coordination success in the step-level public goods game at the societal and individual levels.	As an additional exploratory analysis, we used generalized linear mixed models to examine the association between societal-level honour (and individual-level personal and perceived normative honour values) and the likelihood of contributing 8 or 6 MUs in a given round (see Supplementary Section 3.4.1 for more information). Using the sum of an individual's own investment and expected partner's investment in a given round, we categorized a given game round in the step-level public goods game as anticipated *efficient coordination* success, *less-efficient coordination* success and *failed coordination* (see Supplementary Section 3.4.3 for more information). We then used generalized linear mixed models to explore the association between societal-level honour or individual-level honour values and the occurrence of anticipated success of efficient coordination or less-efficient coordination (i.e., the likelihood of a game round being categorized as efficient coordination success or less-efficient coordination success).	These unregistered exploratory analyses provided us with novel insights into the association between honour, coordination, and anticipation of coordination dynamics and outcomes with unrelated others in one's society. Given that each contributing 8 MUs is one of the Nash equilibria in the current step-level public goods game (see Supplementary Section 5.2 for more information), these analyses can further reveal how closely individuals aligned their behaviour with rational, self-interested decision-making strategies, and how honour values may relate to adherence to this equilibrium.
	Timing	After data access			

Table S2 (continued)

#		Details	Original Wording	Deviation Description	Reader Impact
6	Type	Research Q(s); Analysis	We did not pre-register to explore the differences between one's own investment and expectations of other's investment, and whether honour values would be associated with different types of behavioural deviations from expectations at both societal and individual levels.	As an additional exploratory analysis, we categorized a given game round in the contest game as *underinvested competition*, *tie*, *efficient competition*, and *less-efficient competition* (see Supplementary Section 3.5.1 for more information), and categorized a given game round in the step-level public goods game as *underinvested cooperation*, *conditional cooperation*, and *unconditional cooperation* (see Supplementary Section 3.5.2 for more information). We then used generalized linear mixed models to explored the association between societal-level honour or individual-level honour values and a) the occurrence of efficient competition or less-efficient competition (i.e., the likelihood of a game round being categorized as efficient competition and less-efficient competition), and b) the occurrence of conditional cooperation or unconditional cooperation (i.e., the likelihood of a game round being categorized as conditional cooperation or unconditional cooperation).	Since the games used in the present study define both competing and cooperating as investing behaviour, it is challenging to distinguish the general tendency to allocate monetary units (and expect others to do so) from the behaviours (and expectations) measured in these two games. This deviation approach helped address this challenge by examining how individuals behave relative to their expectations of their game partner's behaviour. These unregistered exploratory analyses provided us with novel insights into the association between honour and competitive and cooperative behavioural patterns relative to one's expectations of other's behaviours. There findings complemented the results from our pre-registered hypotheses and research questions.
	Timing	After data access			

Note. The present study has been pre-registered on OSF (https://osf.io/r9atc) before data collection. We reported preregistration deviations following the guide by Willroth and Atherton[1].

2. Obtaining Factor Scores for Robustness Checks

As explained in the unregistered steps (see Table S2), we did not specify in the pre-registration whether we will use observed scores or factor scores of the predictor variables of interest (e.g., personal and perceived normative honour values, beliefs in a zero-sum game, relational mobility). To provide robust findings, we conducted analysis using observed scores (e.g., unweighted means of scale items at the individual level, society means at the societal level) and used factor scores as a robustness check. Compared to simply averaging ratings from multiple items, factor scores offer advantages such as weighting items based on their loadings onto the factor and allowing for adjustment of response style. For each of the four sets of items (i.e., personal honour values, perceived normative honour values, relational mobility, belief in a zero-sum game), we conducted multilevel confirmatory factor analysis (CFA) to separately model factors at the within- and between-society levels.

We conducted the analyses using Mplus Version 8.10[2]. We evaluated model fit using the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Squared Residual (SRMR). Values of CFI and TLI > .95 (or > .90) RMSEA < .06 (or < .08), and SRMR < .08 (or < .10) have been proposed as criteria for "good" (or "acceptable") fit[3,4]. For multilevel models, Mplus provides separate values of SRMR for the within-society and between-society parts of the model: $SRMR_{within}$ and $SRMR_{between}$. However, it is known that SRMR becomes inflated and is arguably of limited use with sample sizes below 200[5]. With 13 units of analysis at the between-society level of our multilevel models, we therefore considered that values of $SRMR_{between} < .20$ should be considered acceptable, provided that other fit indices did not suggest otherwise.

2.1 Perceived normative and personal honour values

For both personal and perceived normative honour values, we adopted a multilevel measurement model based on recent research[6]. This measurement model included one culture-level content factor of honour, and separated honour values into two distinct content factors, (a) defending family reputation and (b) self-promotion and retaliation, at the individual level. To adjust for differences in response style in the measurement model, we created four indicators of acquiescent responding, each defined by averaging a pair of items with opposing substantive content from the relational mobility measure (e.g., averaged agreement with "*It is common for these people to have a conversation with someone they have never met before*" and "*It is uncommon for these people to have a conversation with people they have never met before*" without reverse scoring). We used these items to anchor a method factor which allowed us to adjust our measures of perceived normative values (and personal values) for acquiescent responding both at the individual and cultural level. The model fitted the data well (perceived normative values: $\chi^2_{[161]} = 880.721$, $CFI = .958$, $TLI = .952$, $RMSEA = .036$, $SRMR_{Within} = .114$, $SRMR_{Between} = .145$; personal values: $\chi^2_{[161]} = 898.684$, $CFI = .958$, $TLI = .953$, $RMSEA = .037$, $SRMR_{Within} = .082$, $SRMR_{Between} = .173$). The between-society level content factor of honour values showed significant variance in the multilevel CFA model for both personal ($p = 0.016$) and perceived normative values ($p = 0.020$), indicating cross-societal variation in both personal and perceived normative honour values. Factor scores for societal-level honour values and individual-level honour values, the latter including the dimensions of defence of family reputation, and self-promotion and retaliation, were saved from the final CFA models for personal and perceived normative honour values (see Mplus syntax file "personal_honor_values.out" and "perceived_normative_honor_values.out" on OSF at https://osf.io/3dscw/).

2.2 Belief in a zero-sum game

To obtain factor scores for belief in a zero-sum game[7], we applied a multilevel approach, including two content factors, one at the within-society level and the other at the between-society level. The same approach was used to adjust for differences in response style as was used for honour values, i.e., four indicators of acquiescent responding were created from selected items of the relational mobility measure to anchor method factors at the within- and between-samples level (see 2.1 Personal and perceived normative honour values). Two items ("*When some people are getting poorer, it means that other people are getting richer*", "*The wealth of a few is acquired at the expense of many*") were retained only at the within, but not the between-society level due to negative loadings and these items were therefore centered within societies. The model fitted the data well ($\chi^2_{[96]}$ = 837.868, *CFI* = .946, *TLI* = .937, *RMSEA* = .052, $SRMR_{Within}$ = .057, $SRMR_{Between}$ = .185). However, the between-society level content factor of beliefs in a zero-sum game did not show significant variance in the multilevel CFA model (p = .118), indicating that beliefs in a zero-sum game may not differ much at the societal level among the current samples. Factor scores for societal-level and individual-level beliefs in a zero-sum game were saved from the final CFA model for beliefs in a zero-sum game (see Mplus syntax file "bzsg.out" on OSF at https://osf.io/3dscw/).

2.3 Relational mobility

For relational mobility, we referred to the measurement model demonstrated in a previous study[8], and adopted a multilevel approach to obtain factor scores for relational mobility at the individual and culture-levels. The within-society part of the measurement model therefore included two first-order content factors (i.e., a "meeting" factor capturing the degree to which a society or social context affords opportunities for individuals to meet new people and forge new relationships, and a "choosing" factor capturing the degree to which

people have the freedom to choose and leave relationships based on personal preference) and a second-order content factor (i.e., relational mobility); at the between-society level, we modelled a single content factor representing relational mobility. To adjust for differences in response style, we introduced a method factor at both within and between-samples levels to account for variance due to acquiescent responding; all items had a fixed loading of 1 on this factor. The model fitted the data well ($\chi^2_{[107]}$ = 698.674, *CFI* = .956, *TLI* = .946, *RMSEA* = .041, $SRMR_{Within}$ = .033, $SRMR_{Between}$ = .082). However, the between-society level content factor of relational mobility did not show significant variance in the multilevel CFA model (*p* = .287), indicating that relational mobility may not differ much at the societal level among the current samples. Factor scores for societal-level and individual-level relational mobility, the latter including two first-order content factors (i.e., meeting and choosing) and one second-order content factor (i.e., relational mobility), were saved from the final CFA model for relational mobility (see Mplus syntax file "relational_mobility.out" on OSF at https://osf.io/3dscw/).

3. Supporting Analyses
3.1 Competition and cooperation
3.1.1 Cross-societal variation in competition and cooperation

Table S3. Model comparisons testing cross-societal variation in competition and cooperation.

Model	n_{par}	AIC	BIC	logLik	deviance	Chisq	Df	Pr(>Chisq)
m_CGB_0	3	83571	83595	-41782	83565			
m_CGB_1	4	83541	83573	-41767	83533	31.34	1	< .001
m_CGE_0	3	84535	84558	-42264	84529			
m_CGE_1	4	84497	84529	-42245	84489	39.34	1	< .001
m_SLB_0	3	82373	82397	-41184	82367			
m_SLB_1	4	82335	82367	-41164	82327	39.81	1	< .001
m_SLE_0	3	82602	82626	-41298	82596			
m_SLE_1	4	82567	82599	-41280	82559	37.03	1	< .001

Note. CGB = Competitive behaviour in the contest game, CGE = Expectations about other's competition, SLB = Cooperative behaviour in the step-level public goods game, SLE = Expectations about other's cooperation, n_{par} = number of parameters in the model, AIC = Akaike Information Criterion, BIC = Bayesian Information Criterion, logLik = Log-likelihood, deviance = Deviance of the model, Chisq = Chi-squared statistic for comparing models, Df = Degrees of freedom, Pr(>Chisq) = P-value of the Chi-squared test. m_[###]_0 indicated the intercept only model with participant ID included as a random intercept, m_[###]_1 indicated the intercept only model with participant ID and society included as two random intercepts. Model comparisons were consistently performed by contrasting each m_[###]_1 with each m_[###]_0.

3.1.2 Correlations between competition and cooperation

Table S4. Mixed-effects models with cooperation behaviour (competition behaviour) predicting competition behaviour (cooperation behaviour).

	Model S4a: Competition						**Model S4b: Cooperation**					
Predictors	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*
(Intercept)	1.258	1.250	1.006(26)	0.336	/	/	1.495	1.213	1.232(23)	0.243	/	/
Societal mean cooperation	**0.791**	**0.200**	**3.946(11)**	**0.002**	**0.106**	**[0.047, 0.165]**						
Individual mean cooperation	**0.654**	**0.016**	**41.508(3354)**	**<0.001**	**0.581**	**[0.553, 0.608]**						
Societal mean competition							**0.750**	**0.189**	**3.969(11)**	**0.002**	**0.116**	**[0.052, 0.180]**
Individual mean competition							**0.519**	**0.012**	**41.510(3354)**	**<0.001**	**0.572**	**[0.545, 0.599]**
Participant gender [male]	0.186	0.056	3.312(3355)	0.001	0.092	[0.037, 0.146]	-0.012	0.050	-0.240(3355)	0.810	-0.007	[-0.061, 0.047]
Age	-0.004	0.002	-1.795(3357)	0.073	-0.025	[-0.052, 0.002]	0.006	0.002	3.270(3357)	0.001	0.045	[0.018, 0.072]
Game order [SL-CG]	0.548	0.057	9.677(3358)	<0.001	0.271	[0.216, 0.325]	-0.602	0.050	-12.026(3357)	<0.001	-0.331	[-0.385, -0.277]
Random Effects												
σ^2	2.653						2.103					
τ_{00}	0.028 $_{Society}$						0.029 $_{Society}$					
ICC	0.010						0.013					
N	13 $_{Society}$						13 $_{Society}$					
Observations	3371						3371					
Marginal R^2 / Conditional R^2	0.349 / 0.356						0.358 / 0.367					

Note. Societal mean cooperation = the mean level of cooperation across all participants per society in the step-level public goods game, Individual mean cooperation = the mean level of cooperation per participant across the six decisions in the step-level public goods game (centred within society), Societal mean competition = the mean level of competition across all participants per society in the contest game, Individual mean competition = the mean level of competition per participant across the six decisions in the contest game (centred within society), SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient. The reference level for participant gender was [female], and for game order was [CG-SL]. This table and the tables below showed estimates without adjustments for multiple comparisons unless specified. All tests were two-sided. Degree of freedom and p-values were estimated using the Satterthwaite approximation.

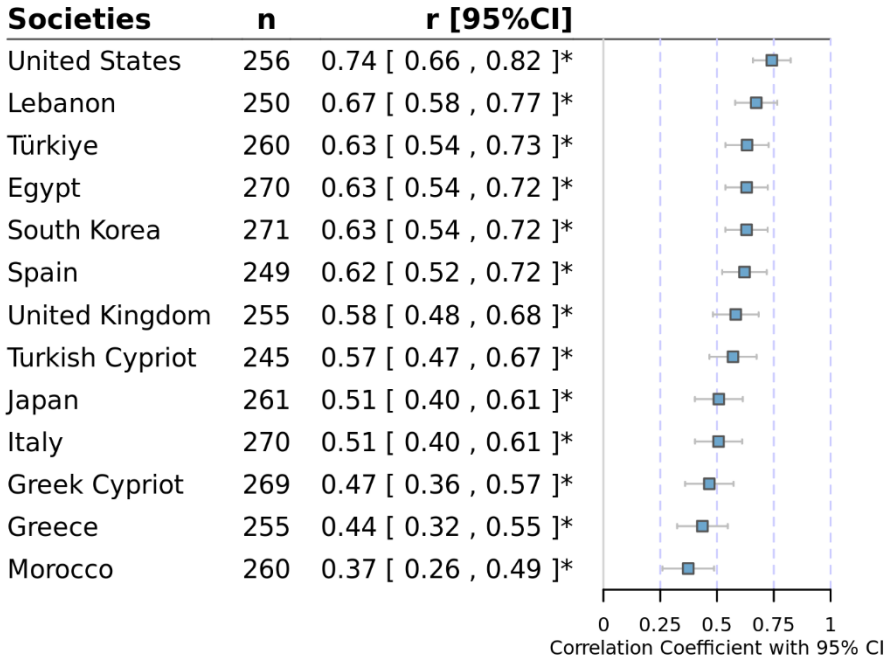

Figure S1. Forest plot of correlations between competitive and cooperative behaviour per society.
Note. n = sample size, r [95%CI] = correlation coefficient [95% confidence interval].
* $p < 0.05$

3.2 Honour and competition

In this section, we present the results of hypothesis testing (Section 3.2.1) and its robustness checks (Section 3.2.2), as well as exploratory analyses (mostly pre-registered) related to honour and competition (Section 3.2.3 to 3.2.6). First, we tested our hypotheses by running models with societal-level and individual-level honour values predicting competition and expectations of other's competition in separate models (Table S5-S6). For societal-level honour, we used a single indicator: the societal mean of perceived normative honour values across two facets — self-promotion and retaliation (SPR) and defence of family reputation (DFR). At the individual level, we derived four honour indicators, including personal values of SPR and DFR, and perceive normative values of SPR and DFR. These individual-level indicators were calculated using unweighted means across the respective scale items (referred to as *observed scores*). Next, we conducted robustness checks by using *factor scores* of honour values to predict competition and expectations of other's competition (Table S7-S8). The rationale for conducting these robustness checks can be found in the unregistered steps outlined in Supplementary Section 1, while details of the factor analysis were provided in Supplementary Section 2.

We also explored potential cross-level interactions, specifically whether societal-level honour would interact with individual-level honour values in predicting competition. This exploratory analysis used both observed scores and factor scores (Table S9). We then explored whether there was contextual effect of societal-level honour on competition and expectations of other's competition, while controlling for individual-level grand mean centred perceived normative honour values (see Table S10). Additionally, we tested whether beliefs in a zero-sum game would account for additional variance in competition beyond honour values at both the societal and individual levels (Table S11-S12). Finally, we explored a set of societal-level indicators that are theoretically relevant to the emergence of

the cultural logic of honour and examined their associations with competition (Table S13-S14).

3.2.1 Honour, competition and expectations about other's competition

In this section, we present the results from models with societal-level honour predicting competition (Model S5a) or expectations of other's competition (Model S6a). Results showed that societal-level honour was positively associated with competition, while no significant association was found with expectations of other's competition. We also fitted an intercept-only model with society and participant as random intercepts (see Model "m_CGB_0" in the online syntax "data_analysis_final.Rmd" on OSF), which showed that the variance of competition at the society level was 0.070. When societal-level honour was added as a predictor, this variance decreased to 0.043 (see Model S5a), suggesting that societal-level honour accounted for 38.57% of the societal-level variance in competition.

We then added four individual-level honour value indicators (centred within society) to the model to test whether personal honour values and perceived normative honour values are associated with competition (Model S5b) or expectations of other's competition (Model S6b). The models controlled for partner gender information, participant gender, age, and order of the game. The generalized variance inflation factor adjusted for the degree of freedom indicated a low risk of multicollinearity in both models [all the $\mathrm{GVIF}^{1/(2\times \mathrm{Df})} < 2$] (see Models "m_CGB_2_vif" and "m_CGE_2_vif" in the online syntax "data_analysis_final.Rmd" on OSF). The model results showed that perceived normative honour values for both facets were positively associated with competition and expectations of other's competition. However, neither the self-promotion and relation nor the defence of family reputation dimensions of personal honour values were associated with competition or expectations of other's competition.

For testing individual-level honour indicators, we conducted robustness checks by adding three additional demographic variables as controls into Models S5b and S6b: parents' education levels (1-8), belongingness to the ethnic majority group in the respective society (no, yes), and living environment (rural, urban, both). There analyses were conducted in Models named "m_CGB_2_RC" and "m_CGE_2_RC" in the online syntax "data_analysis_final.Rmd" on OSF. The results largely replicated findings from Models S5b and S6b. Specifically, perceived normative honour values of self-promotion and retaliation, as well as defence of family reputation, were associated with higher levels of competition [$\beta = .036$, $p = .048$ (SPR), $\beta = .073$, $p < .001$ (DFR), see results from Model object "m_CGB_2_RC"]. However, only perceived normative values of defence of family reputation were positively related to expectations of others' competition [$\beta = .028$, $p = .106$ (SPR); $\beta = .066$, $p = .001$ (DFR), see results from Model object "m_CGE_2_RC"]. Individual-level measures of personal honour values across both facets were not associated with engagement in competitive behaviour (ps > .150).

Table S5. Mixed-effects models with societal-level and individual-level honour values (observed scores) predicting individuals' own competitive behaviours.

	Model S5a: Competition Behaviour						**Model S5b: Competition Behaviour**					
Predictors	*B*	*SE*	*t(df)*	*p*	*std. Beta*	*std. 95% CI*	*B*	*SE*	*t(df)*	*p*	*std. Beta*	*std. 95% CI*
(Intercept)	4.567	0.720	6.346(11)	<0.001	/	/	4.407	0.728	6.053(27)	<0.001	/	/
Societal-level honour	**0.357**	**0.139**	**2.558(11)**	**0.027**	**0.069**	**[0.010, 0.128]**	0.356	0.139	2.559(11)	0.027	0.069	[0.010, 0.128]
Normative honour (SPR)							**0.100**	**0.039**	**2.589(3351)**	**0.010**	**0.047**	**[0.011, 0.082]**
Normative honour (DFR)							**0.154**	**0.045**	**3.447(3351)**	**0.001**	**0.069**	**[0.030, 0.109]**
Personal honour (SPR)							**-0.051**	**0.035**	**-1.453(3351)**	**0.146**	**-0.025**	**[-0.060, 0.009]**
Personal honour (DFR)							**0.051**	**0.044**	**1.149(3351)**	**0.251**	**0.023**	**[-0.016, 0.061]**
Partner gender [male]							0.055	0.027	2.026(16853)	0.043	0.022	[0.001, 0.044]
Partner gender [unknown]							-0.037	0.027	-1.376(16853)	0.169	-0.015	[-0.036, 0.006]
Participant gender [male]							0.264	0.069	3.842(3352)	<0.001	0.106	[0.052, 0.160]
Age							-0.002	0.002	-0.960(3353)	0.337	-0.014	[-0.041, 0.014]
Game order [SL-CG]							0.244	0.069	3.560(3355)	<0.001	0.098	[0.044, 0.152]
Random Effects												
σ^2	2.488						2.487					
τ_{00}	3.629 $_{\text{Participant\_ID: Society}}$						3.535 $_{\text{Participant\_ID: Society}}$					
	0.043 $_{\text{Society}}$						0.043 $_{\text{Society}}$					
ICC	0.596						0.590					
N	3371 $_{\text{Participant\_ID}}$						3371 $_{\text{Participant\_ID}}$					
	13 $_{\text{Society}}$						13 $_{\text{Society}}$					
Observations	20226						20226					
Marginal R^2 / Conditional R^2	0.005 / 0.598						0.021 / 0.599					

Note. SPR = self-promotion and retaliation, DFR = defence of family reputation, SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient, *std. 95% CI* = 95% Confidence Interval of the standardized regression coefficient. The standardization of the regression coefficients were calculated by multiplying the unstandardized coefficient by the ratio of the standard deviation of the predictor to the standard deviation of the outcome variable (this standardization approach was applied to all subsequent models). The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Societal-level honour was the societal mean of perceived normative honour values across both the SPR and DFR facets of honour, while personal honour and normative honour (centred within society) were the individual-level unweighted means across the scale items.

Table S6. Mixed-effects models with societal-level and individual-level honour values (observed scores) predicting individuals' expectations of others' competition.

	Model S6a: Competition Expectation						**Model S6b: Competition Expectation**					
Predictors	*B*	*SE*	*t(df)*	*p*	*std. Beta*	*std. 95% CI*	*B*	*SE*	*t(df)*	*p*	*std. Beta*	*std. 95% CI*
(Intercept)	4.773	0.852	5.600(11)	<0.001	/	/	4.527	0.853	5.308(20)	<0.001	/	/
Societal-level honour	**0.182**	**0.165**	**1.103(11)**	**0.294**	**0.037**	**[-0.037, 0.110]**	0.178	0.164	1.086(11)	0.301	0.036	[-0.037, 0.108]
Normative honour (SPR)							**0.074**	**0.035**	**2.114(3351)**	**0.035**	**0.036**	**[0.003, 0.070]**
Normative honour (DFR)							**0.138**	**0.041**	**3.392(3351)**	**0.001**	**0.065**	**[0.027, 0.102]**
Personal honour (SPR)							-0.034	0.032	-1.073(3351)	0.283	-0.018	[-0.050, 0.015]
Personal honour (DFR)							0.025	0.040	0.629(3351)	0.529	0.012	[-0.025, 0.048]
Partner gender [male]							0.218	0.028	7.678(16853)	<0.001	0.091	[0.068, 0.114]
Partner gender [unknown]							0.050	0.028	1.760(16853)	0.078	0.021	[-0.002, 0.044]
Participant gender [male]							0.121	0.063	1.934(3351)	0.053	0.051	[-0.001, 0.102]
Age							-0.004	0.002	-1.649(3352)	0.099	-0.022	[-0.048, 0.004]
Game order [SL-CG]							0.533	0.062	8.536(3353)	<0.001	0.223	[0.172, 0.274]
Random Effects												
σ^2	2.729						2.718					
τ_{00}	2.929 $_{\text{Participant\_ID: Society}}$						2.818 $_{\text{Participant\_ID: Society}}$					
	0.069 $_{\text{Society}}$						0.068 $_{\text{Society}}$					
ICC	0.523						0.515					
N	3371 $_{\text{Participant\_ID}}$						3371 $_{\text{Participant\_ID}}$					
	13 $_{\text{Society}}$						13 $_{\text{Society}}$					
Observations	20226						20226					
Marginal R^2 / Conditional R^2	0.001 / 0.524						0.024 / 0.526					

Note. SPR = self-promotion and retaliation, DFR = defence of family reputation, SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient, *std. 95% CI* = 95% Confidence Interval of the standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Societal-level honour was the societal mean of perceived normative honour values across both the SPR and DFR facets of honour, while personal honour and normative honour (centred within society) were the individual-level unweighted means across the scale items.

3.2.2 Robustness check using factor scores for honour values

In this section, we present results from models using factor scores of honour values at the societal and individual level to predict competition and expectations of other's competition as robustness checks. The results of Model S7a replicated the positive association between societal-level honour and competition found in Model S5a. At the individual-level, the results similarly replicated the positive association between each dimension of perceived normative honour values and competition (Model S7b), as well as expectations of other's competition (Model S8b), although the coefficient for perceived normative honour values of self-promotion and retaliation in predicting expectations was marginally significant. As in previous models using observed scores, factor scores of personal honour values did not predict competition or expectations of other's competition (see Model S7b and S8b).

Table S7. Mixed-effects models with societal-level and individual-level honour values (factor scores) predicting individuals' own competitive behaviours.

	Model S7a: Competition Behaviour						**Model S7b: Competition Behaviour**					
Predictors	*B*	*SE*	*t(df)*	*p*	*std. Beta*	*std. 95% CI*	*B*	*SE*	*t(df)*	*p*	*std. Beta*	*std. 95% CI*
(Intercept)	6.400	0.070	91.395(11)	<0.001	/	/	6.223	0.133	46.932(25)	<0.001	/	/
Societal-level honour (fs)	**0.420**	**0.187**	**2.249(11)**	**0.046**	**0.063**	**[0.001, 0.125]**	0.409	0.189	2.169(11)	0.053	0.062	[-0.001, 0.124]
Normative honour (SPR) (fs)							**0.185**	**0.081**	**2.275(3353)**	**0.023**	**0.046**	**[0.006, 0.086]**
Normative honour (DFR) (fs)							**0.152**	**0.068**	**2.248(3352)**	**0.025**	**0.052**	**[0.007, 0.097]**
Personal honour (SPR) (fs)							**-0.061**	**0.085**	**-0.718(3352)**	**0.473**	**-0.012**	**[-0.043, 0.020]**
Personal honour (DFR) (fs)							**0.063**	**0.059**	**1.068(3351)**	**0.286**	**0.020**	**[-0.017, 0.057]**
Partner gender [male]							0.055	0.027	2.026(16853)	0.043	0.022	[0.001, 0.044]
Partner gender [unknown]							-0.037	0.027	-1.376(16853)	0.169	-0.015	[-0.036, 0.006]
Participant gender [male]							0.263	0.069	3.825(3352)	<0.001	0.106	[0.052, 0.160]
Age							-0.002	0.002	-0.806(3353)	0.420	-0.011	[-0.039, 0.016]
Game order [SL-CG]							0.239	0.069	3.477(3354)	0.001	0.096	[0.042, 0.150]
Random Effects												
σ^2	2.488						2.487					
τ_{00}	3.629 $_{\text{Participant\_ID:Society}}$						3.546 $_{\text{Participant\_ID:Society}}$					
	0.048 $_{\text{Society}}$						0.050 $_{\text{Society}}$					
ICC	0.596						0.591					
N	3371 $_{\text{Participant\_ID}}$						3371 $_{\text{Participant\_ID}}$					
	13 $_{\text{Society}}$						13 $_{\text{Society}}$					
Observations	20226						20226					
Marginal R^2 / Conditional R^2	0.004 / 0.598						0.019 / 0.599					

Note. fs = factor score, SPR = self-promotion and retaliation, DFR = defence of family reputation, SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient, *std. 95% CI* = 95% Confidence Interval of the standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Societal-level honour (fs) was the societal-level factor scores of perceived normative honour values across both the SPR and DFR facets of honour, while personal honour (fs) and normative honour (fs) were the individual-level factor scores.

Table S8. Mixed-effects models with societal-level and individual-level honour values (factor scores) predicting individuals' expectations of others' competition.

	Model S8a: Competition Expectation						**Model S8b: Competition Expectation**					
Predictors	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*
(Intercept)	5.709	0.071	80.566(11)	<0.001	/	/	5.426	0.124	43.691(23)	<0.001	/	/
Societal-level honour (fs)	**0.391**	**0.189**	**2.071(11)**	**0.063**	**0.061**	**[-0.004, 0.127]**	0.378	0.187	2.017(11)	0.069	0.059	[-0.005, 0.124]
Normative honour (SPR) (fs)							**0.138**	**0.074**	**1.865(3352)**	**0.062**	**0.036**	**[-0.002, 0.074]**
Normative honour (DFR) (fs)							**0.140**	**0.062**	**2.272(3352)**	**0.023**	**0.049**	**[0.007, 0.092]**
Personal honour (SPR) (fs)							-0.033	0.077	-0.431(3352)	0.666	-0.007	[-0.037, 0.023]
Personal honour (DFR) (fs)							0.027	0.053	0.503(3351)	0.615	0.009	[-0.026, 0.044]
Partner gender [male]							0.218	0.028	7.678(16853)	<0.001	0.091	[0.068, 0.114]
Partner gender [unknown]							0.050	0.028	1.760(16853)	0.078	0.021	[-0.002, 0.044]
Participant gender [male]							0.121	0.063	1.931(3351)	0.054	0.051	[-0.001, 0.102]
Age							-0.003	0.002	-1.462(3353)	0.144	-0.019	[-0.046, 0.007]
Game order [SL-CG]							0.528	0.062	8.459(3354)	<0.001	0.221	[0.170, 0.272]
Random Effects												
σ^2	2.729						2.718					
τ_{00}	2.929 $_{\text{Participant\_ID:Society}}$						2.827 $_{\text{Participant\_ID:Society}}$					
	0.052 $_{\text{Society}}$						0.051 $_{\text{Society}}$					
ICC	0.522						0.514					
N	3371 $_{\text{Participant\_ID}}$						3371 $_{\text{Participant\_ID}}$					
	13 $_{\text{Society}}$						13 $_{\text{Society}}$					
Observations	20226						20226					
Marginal R^2 / Conditional R^2	0.004 / 0.524						0.025 / 0.526					

Note. fs = factor score, SPR = self-promotion and retaliation, DFR = defence of family reputation, SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient, *std. 95% CI* = 95% Confidence Interval of the standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Societal-level honour (fs) was the societal-level factor scores of perceived normative honour values across both the SPR and DFR facets of honour, while personal honour (fs) and normative honour (fs) were the individual-level factor scores.

3.2.3 Societal-level honour as a potential moderator for personal honour values

We pre-registered to explore whether societal-level honour might moderate the relationship between individual-level personal honour values and competition. This allowed us to examine whether the broader societal and cultural context would influence the strength or direction of the relationship between personal endorsement of honour values and competition. We found no consistent evidence for a moderating effect of societal-level honour on the relationship between personal values of self-promotion and retaliation and competition, but found support for the defence of family reputation facet of personal values using both observed scores and factor scores (see Table S9). Simple slope analyses revealed that in societies with lower societal-level honour, personally endorsing values of defence of family reputation was associated with greater competition, whereas in societies with higher societal-level honour, these positive associations became weaker and nonsignificant (or even negative, see Figure S2).

Table S9. Mixed-effects models with individual-level honour values interacting with societal-level honour predicting competition.

	Competition Behaviour											
	Model S9a: Observed scores of honour values						**Model S9b: Factor scores of honour values**					
Predictors	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*
(Intercept)	4.421	0.729	6.067(27)	<0.001	/	/	6.253	0.133	46.991(25)	<0.001	/	/
Personal honour (SPR)	-0.320	0.326	-0.981(3349)	0.326	-0.026	[-0.060, 0.008]	-0.058	0.085	-0.686(3350)	0.493	-0.011	[-0.042, 0.021]
Personal honour (DFR)	0.839	0.382	2.195(3349)	0.028	0.019	[-0.020, 0.058]	0.062	0.059	1.052(3349)	0.293	0.020	[-0.018, 0.057]
Societal-level honour	0.355	0.139	2.555(11)	0.027	0.069	[0.009, 0.128]	0.410	0.189	2.175(11)	0.052	0.062	[-0.001, 0.125]
Personal honour (SPR) × Soci. honour	**0.052**	**0.063**	**0.826(3349)**	**0.409**	**0.013**	**[-0.017, 0.042]**	**0.433**	**0.189**	**2.296(3349)**	**0.022**	**0.031**	**[0.005, 0.057]**
Personal honour (DFR) × Soci. honour	**-0.155**	**0.075**	**-2.077(3349)**	**0.038**	**-0.033**	**[-0.065, -0.002]**	**-0.238**	**0.115**	**-2.082(3349)**	**0.037**	**-0.029**	**[-0.056, -0.002]**
Normative honour (SPR)	0.100	0.039	2.590(3349)	0.010	0.047	[0.011, 0.082]	0.191	0.081	2.361(3351)	0.018	0.048	[0.008, 0.088]
Normative honour (DFR)	0.149	0.045	3.340(3349)	0.001	0.067	[0.028, 0.107]	0.147	0.068	2.180(3350)	0.029	0.050	[0.005, 0.095]
Partner gender [male]	0.055	0.027	2.026(16853)	0.043	0.022	[0.001, 0.044]	0.055	0.027	2.026(16853)	0.043	0.022	[0.001, 0.044]
Partner gender [unknown]	-0.037	0.027	-1.376(16853)	0.169	-0.015	[-0.036, 0.006]	-0.037	0.027	-1.376(16853)	0.169	-0.015	[-0.036, 0.006]
Participant gender [male]	0.269	0.069	3.908(3350)	<0.001	0.108	[0.054, 0.162]	0.271	0.069	3.939(3350)	<0.001	0.109	[0.055, 0.163]
Age	-0.003	0.002	-1.096(3351)	0.273	-0.016	[-0.044, 0.012]	-0.003	0.002	-1.106(3351)	0.269	-0.016	[-0.043, 0.012]
Game order [SL-CG]	0.245	0.069	3.570(3353)	<0.001	0.098	[0.044, 0.153]	0.233	0.069	3.398(3352)	0.001	0.094	[0.040, 0.148]
Random Effects												
σ^2	2.487						2.487					
τ_{00}	3.533 $_{\text{Participant\_ID: Society}}$						3.540 $_{\text{Participant\_ID: Society}}$					
	0.043 $_{\text{Society}}$						0.050 $_{\text{Society}}$					
ICC	0.590						0.591					
N	3371 $_{\text{Participant\_ID}}$						3371 $_{\text{Participant\_ID}}$					
	13 $_{\text{Society}}$						13 $_{\text{Society}}$					
Observations	20226						20226					
Marginal R^2 / Conditional R^2	0.022 / 0.599						0.020 / 0.599					

Note. SPR = self-promotion and retaliation, DFR = defence of family reputation, SL = step-level public goods game, CG = contest game, Soci. = Societal-level, *std. Beta* = standardized regression coefficient, *std. 95% CI* = 95% Confidence Interval of the standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. In Model S9a, societal-level was the societal mean of perceived normative honour values across both the SPR and DFR facets of honour, while personal honour and normative honour (centred within society) were the individual-level unweighted means across the scale items. In Model S9b, societal-level honour was the societal-level factor scores of perceived normative honour values across both the SPR and DFR facets of honour, while personal honour and normative honour were the individual-level factor scores.

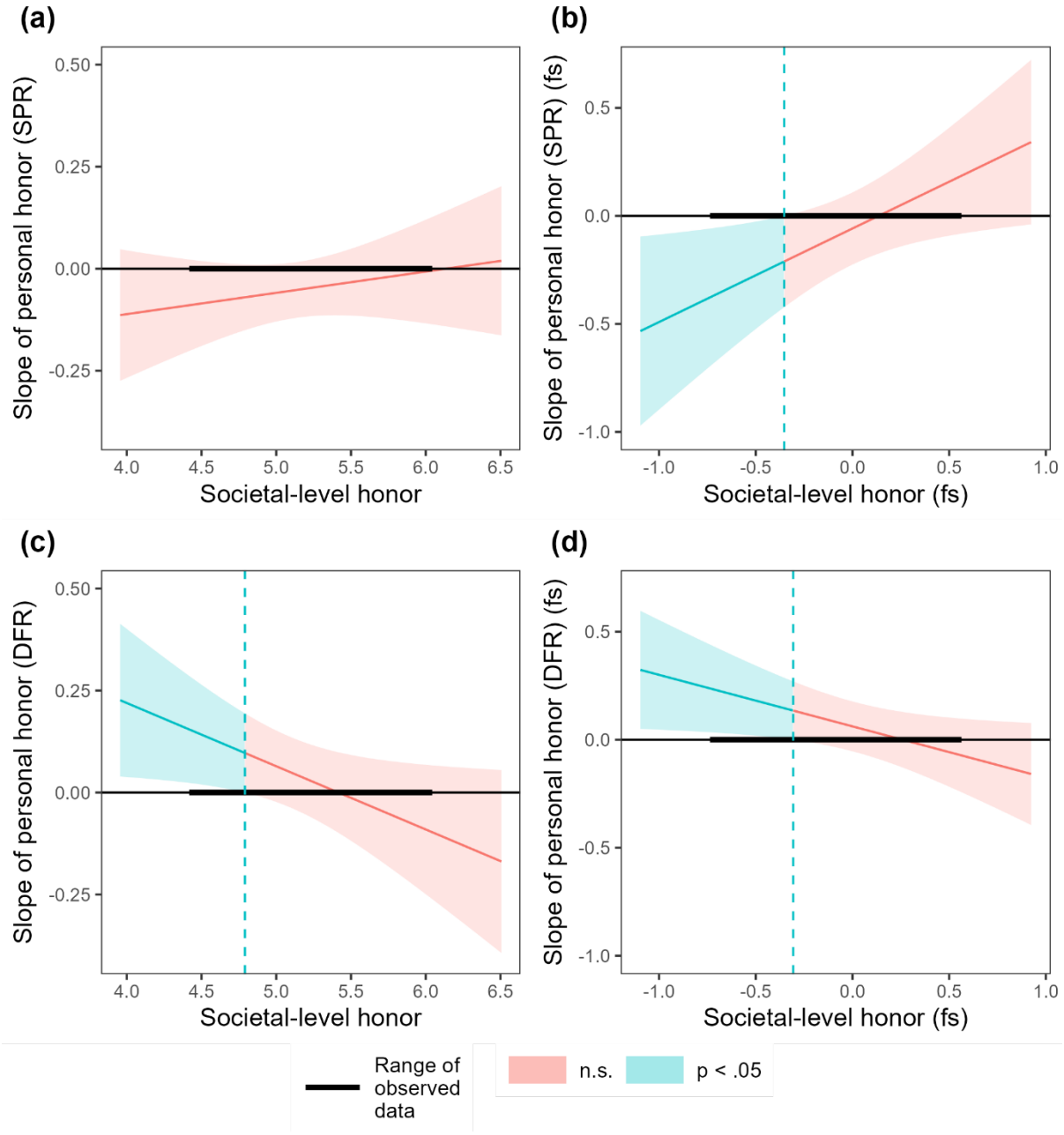

Figure S2. Johnson-Neyman plots for the interaction between personal honour values (self-promotion and retaliation, and defence of family reputation) and societal-level honour in predicting competition behaviour: (a) and (c) using observed scores for honour values, (b) and (d) using factor scores for honour values.

Note. SPR = self-promotion and retaliation, DFR = defence of family reputation, fs = factor scores. The x-axis shows the moderator societal-level honor, and y-axis shows the size of the estimated slope of each facet of personal honor values on competition behaviour. The range of observed scores of societal-level honor was [4.44, 6.03], and for factor scores, it was [-0.72, 0.55]. The solid line represents how the slope changes as the moderator (i.e., societal-level honor) increases. The shadow area represents the 95% confidence intervals around the slope estimate. The blue region marks the range of moderator values where the slope was statistically significant ($p < .05$): (a) interval could not be found, (b) outside the interval [-0.35, 1.36], (c) outside the interval [4.79, 11.26], (d) outside the interval [-0.31, 4.75].

3.2.4 Contextual effects of honour on competition and expectations about other's competition

In this section, we report the results from additional analyses that were not pre-registered to explore the potential contextual effects of honour on competition and expectations about other's competition. The contextual effects describe the differences in competition or expectations about other's competition among participants who have the same level of perceived normative and personal honour values but live in societies with different societal-level honour. In other words, even if individuals share similar perceptions of the societal prevalence of honour values or personally endorse similar levels of honour values, the broader societal context — reflected by the average prevalence of honour values perceived by all participants within the same society — may shape how individuals engage in or expect interpersonal competition. By applying a grand mean centring approach to the observed scores of perceived normative and personal honour values, we were able to further decompose the between-society effects into contextual and individual-level effects[9]. This allowed us to address whether individuals with the same level of perceived normative and personal honour vales, but inhabiting in societies with different societal mean perceived normative honour values, would engage in greater competition or expect more competition from unrelated others.

Specifically, we added grand mean-centred perceived normative and personally endorsed honour values (along with control variables such as participant age and gender, partner gender information, and game order) to Model S5a and S6a in Supplementary Section 3.2.1 to examine the fixed effect of societal-level perceived normative honour values controlling for individual level perceived normative and personal honour values — the contextual effect. The results showed that the association between societal mean perceived normative honour values and competition found in Model S5a became nonsignificant after

controlling for individual-level grand mean-centred perceived normative and personal honour values (see Model S10a). This suggested that for individuals with the same level of perceived normative and personal honour values, there was no evidence that those living in societies with higher societal mean perceived normative honour values would engage in greater competition. Comparing the *B* coefficients in Model S5b (*B* = 0.356, see Supplementary Section 3.2.1) and Model S10a (*B* = 0.091), 74% [i.e., = (0.356 – 0.091) / 0.356] of the variation explained by societal-level honour could be explained by individual-level honour values, particularly perceived normative honour values (SPR: *B* = 0.096, *p* = .013; DFR: *B* = 0.155, *p* < .001). These findings imply that the cultural contexts characterized by varying levels of honour value prevalence shape individual's engagement in interpersonal competition primarily through their perceptions of the prescribed values and norms within those cultural contexts.

Table S10. Mixed-effects models with societal-level and individual-level perceived normative honour values (grand mean centred observed scores) predicting individuals' own competitive behaviours and expectations of others' competition.

	Model S10a: Competition Behaviour						**Model S10b: Competition Expectation**					
Predictors	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*
(Intercept)	5.773	0.744	7.763(28)	<0.001	/	/	5.613	0.851	6.595(21)	<0.001	/	/
Societal-level honour	**0.091**	**0.141**	**0.641(13)**	**0.533**	**0.018**	**[-0.042, 0.077]**	**-0.033**	**0.163**	**-0.202(12)**	**0.843**	**-0.007**	**[-0.078, 0.065]**
Normative honour (SPR)	0.096	0.038	2.493(3359)	0.013	0.049	[0.010, 0.087]	0.072	0.035	2.069(3362)	0.039	0.038	[0.002, 0.074]
Normative honour (DFR)	0.155	0.045	3.486(3361)	<0.001	0.077	[0.034, 0.120]	0.139	0.041	3.429(3358)	0.001	0.071	[0.031, 0.112]
Personal honour (SPR)	-0.051	0.035	-1.478(3236)	0.139	-0.028	[-0.064, 0.009]	-0.038	0.032	-1.211(3330)	0.226	-0.021	[-0.056, 0.013]
Personal honour (DFR)	0.054	0.044	1.242(3356)	0.215	0.027	[-0.016, 0.069]	0.029	0.040	0.723(3362)	0.470	0.015	[-0.025, 0.055]
Partner gender [male]	0.055	0.027	2.026(16853)	0.043	0.022	[0.001, 0.044]	0.218	0.028	7.678(16853)	<0.001	0.091	[0.068, 0.114]
Partner gender [unknown]	-0.037	0.027	-1.376(16853)	0.169	-0.015	[-0.036, 0.006]	0.050	0.028	1.760(16853)	0.078	0.021	[-0.002, 0.044]
Participant gender [male]	0.263	0.069	3.836(3352)	<0.001	0.106	[0.052, 0.160]	0.121	0.062	1.935(3352)	0.053	0.051	[-0.001, 0.102]
Age	-0.002	0.002	-0.987(3354)	0.324	-0.014	[-0.042, 0.014]	-0.004	0.002	-1.675(3353)	0.094	-0.022	[-0.048, 0.004]
Game order [SL-CG]	0.244	0.069	3.562(3355)	<0.001	0.098	[0.044, 0.152]	0.533	0.062	8.538(3353)	<0.001	0.223	[0.172, 0.274]
Random Effects												
σ^2	2.487						2.718					
τ_{00}	3.535 $_{\text{Participant\_ID:Society}}$						2.818 $_{\text{Participant\_ID:Society}}$					
	0.040 $_{\text{Society}}$						0.063 $_{\text{Society}}$					
ICC	0.590						0.515					
N	3371 $_{\text{Participant\_ID}}$						3371 $_{\text{Participant\_ID}}$					
	13 $_{\text{Society}}$						13 $_{\text{Society}}$					
Observations	20226						20226					
Marginal R^2 / Conditional R^2	0.022 / 0.599						0.024 / 0.526					

Note. SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient, *std. 95% CI* = 95% Confidence Interval of the standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Societal-level honour was the societal mean of perceived normative honour values across both the self-promotion and retaliation, and the defence of family reputation facets of honour, while normative honour (centred at the grand mean) was the individual-level unweighted means across all the scale items measuring perceived normative honour values, including both the self-promotion and retaliation, and the defence of family reputation facets of honour.

3.2.5 Additional explanation for competition: Beliefs in a zero-sum game

We pre-registered to test whether there are other cultural factors additional to honour values that may explain between-individuals level and between-societies level variation in competition. *Beliefs in a zero-sum game* is the belief that "one person's gain is possible only at the expense of other persons"[7]. With its roots in classic game theory, zero-sum belief captures the generalized beliefs about the nature of social relations involving completely conflicting interests. Previous research suggests that zero-sum belief can lead to competition and conflict, and varies across societies and social economic status[7,10]. Therefore, we examined whether beliefs in a zero-sum game could explain additional variation in competition beyond what was explained by honour values.

We did not find evidence that societal-level beliefs in a zero-sum game explained variation in competition beyond societal-level honour (see Model S11a), nor that individual-level beliefs in a zero-sum game explained variation beyond personal and perceived normative honour values (see Model S11b). These results were replicated while using factor scores of honour values and beliefs in a zero-sum game at the societal-level and individual-level (see Table S12). This indicated that beliefs in a zero-sum game may not provide additional explanation for competition beyond honour values at either level.

However, interpretations of the societal-level patterns should be approached with caution due to two key factors: Firstly, the relatively small societal-level sample size (i.e., $N_{society} = 11$) may limit the statistical power and generalizability of our findings. Secondly, results from the multilevel confirmatory factor analysis indicated that zero-sum beliefs may not vary significantly among the societies sampled in this study (see Section 2.2). At the individual level, we observed that both perceived normative and personal honour values, especially the facets of self-promotion and retaliation, were positively correlated with zero-sum game beliefs (see Figures S4a and S4b). Hence, perceived normative and personal

honour values might already account for that part of the variation in competition that could have been attributed to zero-sum beliefs.

Table S11. Mixed-effects models with societal-level and individual-level honour values and beliefs in a zero-sum game (observed scores) predicting individuals' own competitive behaviours.

	Model S11a: Competition Behaviour						**Model S11b: Competition Behaviour**					
Predictors	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*
(Intercept)	5.026	1.439	3.493(8)	0.008	/	/	4.947	1.447	3.419(17)	0.009	/	/
Societal-level honour	0.544	0.234	2.328(8)	0.049	0.090	[0.001, 0.180]	0.541	0.234	2.313(8)	0.050	0.090	[0.000, 0.179]
Societal-level BZSG	**-0.372**	**0.428**	**-0.868(8)**	**0.411**	**-0.033**	**[-0.123, 0.056]**	-0.369	0.429	-0.861(8)	0.414	-0.033	[-0.122, 0.056]
Normative honour (SPR)							0.057	0.043	1.320(2841)	0.187	0.026	[-0.012, 0.063]
Normative honour (DFR)							0.193	0.049	3.921(2841)	<0.001	0.082	[0.041, 0.123]
Personal honour (SPR)							-0.021	0.040	-0.535(2841)	0.593	-0.010	[-0.048, 0.028]
Personal honour (DFR)							0.032	0.048	0.671(2841)	0.502	0.014	[-0.027, 0.054]
Beliefs in a zero-sum game							**-0.003**	**0.040**	**-0.068(2841)**	**0.946**	**-0.001**	**[-0.033, 0.031]**
Partner gender [male]							0.064	0.030	2.174(14298)	0.030	0.026	[0.003, 0.049]
Partner gender [unknown]							-0.031	0.030	-1.037(14298)	0.300	-0.012	[-0.036, 0.011]
Participant gender [male]							0.244	0.075	3.274(2841)	0.001	0.098	[0.039, 0.157]
Age							-0.005	0.003	-1.753(2843)	0.080	-0.027	[-0.057, 0.003]
Game order [SL-CG]							0.286	0.074	3.844(2843)	<0.001	0.115	[0.056, 0.174]
Random Effects												
σ^2	2.492						2.491					
τ_{00}	3.630 $_{\text{Participant\_ID:Society}}$						3.539 $_{\text{Participant\_ID:Society}}$					
	0.055 $_{\text{Society}}$						0.055 $_{\text{Society}}$					
ICC	0.596						0.591					
N	2860 $_{\text{Participant\_ID}}$						2860 $_{\text{Participant\_ID}}$					
	11 $_{\text{Society}}$						11 $_{\text{Society}}$					
Observations	17160						17160					
Marginal R^2 / Conditional R^2	0.006 / 0.599						0.022 / 0.600					

Note. BZSG = beliefs in a zero-sum game, SPR = self-promotion and retaliation, DFR = defence of family reputation, SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient, *std. 95% CI* = 95% Confidence Interval of the standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Societal-level honour was the societal mean of perceived normative honour values across both the SPR and DFR facets of honour, and societal-level BZSG was the societal mean of beliefs in a zero-sum game, while personal honour, normative honour and beliefs in a zero-sum game (centred within society) were the individual-level unweighted means across the scale items. We did not include data on beliefs in a zero-sum game for the UK and the USA because participants' responses in these two societies were recorded on a seven-point scale due to a survey programming error, while a six-point scale was used in the other samples.

Table S12. Mixed-effects models with societal-level and individual-level honour values and beliefs in a zero-sum game (factor scores) predicting individuals' own competitive behaviours.

	Model S12a: Competition Behaviour						**Model S12b: Competition Behaviour**					
Predictors	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*
(Intercept)	6.374	0.098	64.784(8)	<0.001	/	/	6.262	0.158	39.709(16)	<0.001	/	/
Societal-level honour (fs)	0.459	0.442	1.039(8)	0.330	0.049	[-0.061, 0.160]	0.444	0.445	0.998(8)	0.348	0.048	[-0.063, 0.158]
Societal-level BZSG (fs)	**-0.358**	**0.598**	**-0.599(8)**	**0.566**	**-0.029**	**[-0.139, 0.082]**	-0.374	0.601	-0.622(8)	0.551	-0.030	[-0.141, 0.081]
Normative honour (SPR) (fs)							0.106	0.090	1.172(2842)	0.241	0.026	[-0.017, 0.069]
Normative honour (DFR) (fs)							0.222	0.074	2.981(2842)	0.003	0.073	[0.025, 0.121]
Personal honour (SPR) (fs)							0.027	0.096	0.285(2842)	0.776	0.005	[-0.030, 0.040]
Personal honour (DFR) (fs)							0.039	0.064	0.606(2841)	0.545	0.012	[-0.028, 0.052]
Beliefs in a zero-sum game (fs)							**-0.001**	**0.058**	**-0.020(2841)**	**0.984**	**-0.000**	**[-0.030, 0.030]**
Partner gender [male]							0.064	0.030	2.174(14298)	0.030	0.026	[0.003, 0.049]
Partner gender [unknown]							-0.031	0.030	-1.037(14298)	0.300	-0.012	[-0.036, 0.011]
Participant gender [male]							0.244	0.075	3.273(2841)	0.001	0.098	[0.039, 0.157]
Age							-0.004	0.003	-1.507(2843)	0.132	-0.023	[-0.053, 0.007]
Game order [SL-CG]							0.285	0.074	3.834(2842)	<0.001	0.115	[0.056, 0.173]
Random Effects												
σ^2	2.492						2.491					
τ_{00}	3.630 $_{\text{Participant\_ID:Society}}$						3.540 $_{\text{Participant\_ID:Society}}$					
	0.060 $_{\text{Society}}$						0.061 $_{\text{Society}}$					
ICC	0.597						0.591					
N	2860 $_{\text{Participant\_ID}}$						2860 $_{\text{Participant\_ID}}$					
	11 $_{\text{Society}}$						11 $_{\text{Society}}$					
Observations	17160						17160					
Marginal R^2 / Conditional R^2	0.005 / 0.599						0.022 / 0.600					

Note. fs = factor score, BZSG = beliefs in a zero-sum game, SPR = self-promotion and retaliation, DFR = defence of family reputation, SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient, *std. 95% CI* = 95% Confidence Interval of the standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Societal-level honour (fs) was the societal-level factor scores of perceived normative honour values across both the SPR and DFR facets of honour, and societal-level BZSG (fs) was the societal-level factor scores of beliefs in a zero-sum game, while personal honour (fs), normative honour (fs) and beliefs in a zero-sum game (fs) were the individual-level factor scores. We did not include data on beliefs in a zero-sum game for the UK and the USA because participants' responses in these two societies were recorded on a seven-point scale due to a survey programming error, while a six-point scale was used in the other samples.

3.2.6 Other societal-level indicators and competition

In this section, we report the results of a series of mixed effects models, where each model included one societal-level indicator predicting competition (see Table S13 for the operationalization of these societal-level indicators). The results showed that among all these societal-level indicators, only GNI ($\beta = -.060$, $p = .047$), and market competitiveness ($\beta = -.063$, $p = .037$) were negatively associated with competition (see Table S14). Interestingly, intercorrelations revealed that GNI and market competitiveness were among the strongest societal-level indicators that negatively correlated with societal-level honour (see Figure S4a and S4b). Here, GNI captures the economic wealth of a country. The Global Competitiveness Index (GCI), used to operationalize market competitiveness, is a complex indicator that assesses the ability of countries to provide high levels of prosperity to their citizens. Thus, within the sample of societies included in our dataset, those societies where honour values were perceived to be more prevalent tended to be harsher environments characterized by lower economic development and prosperity, where more interpersonal competition has been observed (see Section 3.3.6 for analyses on the association between other societal-level indicators and cooperation).

Table S13. Operationalization of societal-level indicators.

Societal-level indicator	Description	Range	Source	Year
Economic indicators				
GDP per capita	Gross Domestic Product per capita (current US$)	N/A	World Bank	2022
GNI	Gross National Income per capita (Atlas method, current US$)	N/A	World Bank	2022
Human Development Index	A summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and having a decent standard of living.	0-1	Human Development Report	2021
Gender Inequality Index	A composite measure reflecting inequality in achievement between women and men in three dimensions: reproductive health, empowerment and the labour market.	0-1	Human Development Report	2021
Institutions				
Government Effectiveness	Government effectiveness	−2.5–2.5	World Bank	2022
Rule of law	Rule of Law	−2.5–2.5	World Bank	2022
Political Stability and Absence of Violence/Terrorism	Political Stability and Absence of Violence/Terrorism	−2.5–2.5	World Bank	2022
Corruption control	Control of corruption	−2.5–2.5	World Bank	2022
Corruption perception index	Perceived levels of public sector corruption	0-100	Transparency International	2022
Market competitiveness	Global competitiveness index (GCI), which captures the microeconomic and macroeconomic foundations of national competitiveness.	0-100	World Economic Forum	2019
Historical and ecological threats				
Historical prevalence of pathogens	Prevalence of leishmanias, schistosomes, trypanosomes, leprosy, malaria, typhus, filariae, dengue, and tuberculosis	0–3	Murray & Schaller (2010)[11]	N/A
World risk index	The disaster risk from extreme natural events and negative climate change impacts (Interaction of exposure and vulnerability).	0-100	The World Risk Report	2022
Exposure	The extent to which populations in hazard-prone areas are exposed to and burdened by the impacts of extreme natural events or the negative consequences of climate change.	0-100	The World Risk Report	2022
Vulnerability	The predisposition of populations to be vulnerable to damage from extreme natural events or negative impacts of climate change. It is composed of the three dimensions of susceptibility, lack of coping capacities, and lack of adaptive capacities, which are subdivided into further categories.	0-100	The World Risk Report	2022

Table S14. A series of mixed-effects models for each societal-level indicator predicting competition in separate models.

		Models S13a-S13n: Competition Behaviour								
#	**Societal-level indicator**	***B***	***SE***	***t*(*df*)**	***p***	***std. Beta***	***std. 95%CI***	$N_{society}$	$N_{participant}$	$N_{observation}$
	Economic indicators									
a	GDP per capita	-0.149	0.071	-2.095(10)	0.063	-0.057	[-0.111, -0.004]	12	3126	18756
b	GNI	-0.157*	0.069	-2.260(10)	0.047	-0.060	[-0.112, -0.008]	12	3126	18756
c	Human development index	-0.132	0.074	-1.773(10)	0.107	-0.051	[-0.107, 0.005]	12	3126	18756
d	Gender inequality	0.143	0.072	1.989(10)	0.075	0.055	[0.001, 0.110]	12	3126	18756
	Institutions									
e	Government effectiveness	-0.093	0.080	-1.156(10)	0.274	-0.036	[-0.096, 0.025]	12	3126	18756
f	Rule of law	-0.016	0.085	-0.192(10)	0.852	-0.006	[-0.070, 0.058]	12	3126	18756
g	Political stability	-0.018	0.085	-0.206(10)	0.841	-0.007	[-0.071, 0.057]	12	3126	18756
h	Corruption control	-0.051	0.084	-0.613(10)	0.554	-0.020	[-0.083, 0.043]	12	3126	18756
i	Corruption perceptions index	-0.136	0.074	-1.844(10)	0.095	-0.052	[-0.108, 0.003]	12	3126	18756
j	Market competitiveness	-0.163*	0.068	-2.407(10)	0.037	-0.063	[-0.114, -0.012]	12	3126	18756
	Historical and ecological threats									
k	Historical prevalence of infectious disease	0.122	0.076	1.596(10)	0.141	0.047	[-0.011, 0.104]	12	3126	18756
l	World risk index	0.092	0.080	1.146(10)	0.278	0.035	[-0.025, 0.096]	12	3126	18756
m	Exposure	-0.027	0.085	-0.320(10)	0.756	-0.010	[-0.074, 0.054]	12	3126	18756
n	Vulnerability	0.112	0.077	1.451(10)	0.178	0.043	[-0.015, 0.102]	12	3126	18756

Note. std. Beta = standardized regression coefficient, *std. 95% CI* = 95% Confidence Interval of the standardized regression coefficient, $N_{society}$ = number of societies, $N_{participant}$ = number of participants, $N_{observation}$ = number of observations at the decision level. Unstandardized regression coefficients (*B*) were marked with an asterisk if they were significant at the 0.05 level. See Table S13 for the operationalization for each societal-level indicator.

3.3 Honour and cooperation

In this section, we present the results addressing our main research questions on honour and cooperation (Section 3.3.1) and their robustness checks (Section 3.3.2), as well as exploratory analyses related to honour and cooperation (Section 3.3.3 to 3.3.8). First, we ran models with societal-level and individual-level honour values (using *observed scores*) predicting cooperation and expectations of other's cooperation in separate models (Table S15-S16). Next, we conducted robustness checks by using *factor scores* of honour values to predict cooperation and expectations of other's cooperation (Table S17-S18). The rationale for conducting these robustness checks can be found in the unregistered steps outlined in Supplementary Section 1, while details of the factor analysis were provided in Supplementary Section 2.

We also explored potential cross-level interactions, specifically whether societal-level honour would interact with individual-level honour values in predicting cooperation. This exploratory analysis used both observed scores and factor scores (Table S19). We then explored whether there was contextual effect of societal-level honour on cooperation and expectations of other's cooperation, while controlling for individual-level grand mean centred perceived normative honour values (Table S20). Additional, we tested whether relational mobility would account for additional variance in cooperation beyond honour values at both the societal and individual levels (Table S21-S22). Moreover, we explored a set of societal-level indicators that are theoretically relevant to the emergence of the cultural logic of honour and examined their associations with cooperation (Table S23).

As pre-registered, we further conducted secondary analyses of existing datasets to explore whether societal-level honour relates to cooperation versus non-cooperation in situations where non-cooperation can always yield the best outcome for an individual regardless of what others do (i.e., prisoner's dilemma, public goods dilemma, Table S24-

S26). Finally, we conducted analyses exploring the association between societal-level honour or individual-level honour values and the likelihood of contributing 8 MUs or contributing 6 MUs following a compelling decision rule of equally splitting the cost of meeting the provision points in the step-level public goods game (Table S27-S28).

3.3.1 Honour, cooperation and expectations about other's cooperation

In this section, we present the results from models with societal-level honour predicting cooperation (Model S15a) or expectations of other's cooperation (Model S16a). Results showed that societal-level honour was positively associated with cooperation and with expectations of other's competition. We also fitted an intercept-only model with society and participant as random intercepts (see Model "m_SLB_0" in the online syntax "data_analysis_final.Rmd" on OSF), which showed that the variance of cooperation at the society level was 0.067. When societal-level honour was added as a predictor, this variance decreased to 0.035 (see Model S15a), suggesting that societal-level honour accounted for 47.76% of the societal-level variance in competition.

We then added four individual-level honour value indicators to the model to test whether perceived normative and personal honour values were associated with cooperation (Model S15b) or expectations of other's cooperation (Model S15b). The models controlled for partner gender information, participant gender, age, and order of the game. The generalized variance inflation factor adjusted for the degree of freedom indicated a low risk of multicollinearity in both models [all the $\mathrm{GVIF}^{1/(2\times \mathrm{Df})} < 2$] (see Models "m_SLB_2_vif" and "m_SLE_2_vif" in the online syntax "data_analysis_final.Rmd" on OSF). The model results showed that perceiving honour values of self-promotion and retaliation as more prevalent in one's society, positively predicted cooperation (see Model 15b) and expectations of other's cooperation (though marginally significant, see Model 16b). Perceiving honour values of defence of family reputation to be more prevalent in one's society positively

predicted expectations of other's cooperation (see Model 16b), and while its association with individuals' own cooperation was not significant, it exhibited a positive trend (see Model 15b). Personally endorsing honour values related to defence of family reputation was also positively associated with individual's own cooperation (see Model 15b) and expectations of other's cooperation (see Model 15b). However, personal values of self-promotion and retaliation were negatively associated with expectations of other's cooperation (see Model S16b), and although their association with individuals' own cooperation was not significant, the direction of the relationship was also negative (see Model 15b).

For testing individual-level honour indicators, we conducted robustness checks by adding three additional demographic variables as controls into Models S15b and S16b: parents' education levels (1-8), belongingness to the ethnic majority group in the respective society (no, yes), and living environment (rural, urban, both). There analyses were conducted in Models named "m_SLB_2_RC" and "m_SLE_2_RC" in the online syntax "data_analysis_final.Rmd" on OSF. The results largely replicated findings from Models S15b and S16b. Specifically, perceived normative values of self-promotion and retaliation predicted more cooperation ($\beta = .047$, $p = .007$, see results from Model object "m_SLB_2_RC"), and perceived normative values of both facets of honour predicted greater expectation of other's cooperation ($\beta = .036$, $p = .037$ (SPR); $\beta = .068$, $p < .001$ (DFR), see results from Model object "m_SLE_2_RC"). The two facets of personal honour values showed contrasting associations. Personal values of defence of family reputation positively predicted both cooperation ($\beta = .060$, $p = .002$) and expectations of others' cooperation ($\beta = .042$, $p = .023$), while personal values of self-promotion and retaliation negatively predicted expectations of others' cooperation ($\beta = –.043$, $p = .009$).

Table S15. Mixed-effects models with societal-level and individual-level honour values (observed scores) predicting individuals' own cooperative behaviours.

	Model S15a: Cooperation Behaviour						**Model S15b: Cooperation Behaviour**					
Predictors	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*
(Intercept)	4.286	0.652	6.573(11)	<0.001	/	/	4.309	0.667	6.460(27)	<0.001	/	/
Societal-level honour	**0.376**	**0.126**	**2.974(11)**	**0.013**	**0.078**	**[0.020, 0.136]**	0.381	0.127	2.993(11)	0.012	0.080	[0.021, 0.138]
Normative honour (SPR)							**0.095**	**0.034**	**2.784(3351)**	**0.005**	**0.048**	**[0.014, 0.082]**
Normative honour (DFR)							**0.064**	**0.040**	**1.622(3351)**	**0.105**	**0.031**	**[-0.007, 0.069]**
Personal honour (SPR)							**-0.029**	**0.031**	**-0.951(3351)**	**0.342**	**-0.016**	**[-0.049, 0.017]**
Personal honour (DFR)							**0.118**	**0.039**	**3.000(3351)**	**0.003**	**0.057**	**[0.020, 0.093]**
Partner gender [male]							-0.019	0.027	-0.725(16853)	0.468	-0.008	[-0.031, 0.014]
Partner gender [unknown]							-0.012	0.027	-0.437(16853)	0.662	-0.005	[-0.028, 0.018]
Participant gender [male]							0.113	0.061	1.846(3352)	0.065	0.049	[-0.003, 0.101]
Age							0.003	0.002	1.570(3353)	0.116	0.021	[-0.005, 0.048]
Game order [SL-CG]							-0.471	0.061	-7.720(3354)	<0.001	-0.204	[-0.256, -0.152]
Random Effects												
σ^2	2.420						2.420					
τ_{00}	2.846 $_{\text{Participant\_ID:Society}}$						2.727 $_{\text{Participant\_ID:Society}}$					
	0.035 $_{\text{Society}}$						0.037 $_{\text{Society}}$					
ICC	0.544						0.533					
N	3371 $_{\text{Participant\_ID}}$						3371 $_{\text{Participant\_ID}}$					
	13 $_{\text{Society}}$						13 $_{\text{Society}}$					
Observations	20226						20226					
Marginal R^2 / Conditional R^2	0.006 / 0.546						0.029 / 0.547					

Note. SPR = self-promotion and retaliation, DFR = defence of family reputation, SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient, *std. 95% CI* = 95% Confidence Interval of the standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Societal-level honour was the societal mean of perceived normative honour values across both the SPR and DFR facets of honour, while personal honour and normative honour (centred within society) were the individual-level unweighted means across the scale items.

Table S16. Mixed-effects models with societal-level and individual-level honour values (observed scores) predicting individuals' expectations of others' cooperation.

	Model S16a: Cooperation Expectation						**Model S16b: Cooperation Expectation**					
Predictors	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*
(Intercept)	4.391	0.635	6.910(11)	<0.001	/	/	4.342	0.647	6.709(26)	<0.001	/	/
Societal-level honour	**0.306**	**0.123**	**2.488(11)**	**0.030**	**0.066**	**[0.008, 0.125]**	0.309	0.124	2.496(11)	0.030	0.067	[0.008, 0.126]
Normative honour (SPR)							**0.061**	**0.032**	**1.914(3351)**	**0.056**	**0.032**	**[-0.001, 0.065]**
Normative honour (DFR)							**0.139**	**0.037**	**3.763(3351)**	**<0.001**	**0.070**	**[0.034, 0.107]**
Personal honour (SPR)							-0.080	0.029	-2.768(3351)	0.006	-0.045	[-0.076, -0.013]
Personal honour (DFR)							0.090	0.036	2.485(3351)	0.013	0.045	[0.010, 0.081]
Partner gender [male]							0.174	0.027	6.342(16853)	<0.001	0.078	[0.054, 0.102]
Partner gender [unknown]							0.047	0.027	1.713(16853)	0.087	0.021	[-0.003, 0.045]
Participant gender [male]							0.056	0.057	0.990(3352)	0.322	0.025	[-0.025, 0.075]
Age							0.001	0.002	0.734(3353)	0.463	0.010	[-0.016, 0.035]
Game order [SL-CG]							-0.253	0.057	-4.456(3354)	<0.001	-0.114	[-0.164, -0.064]
Random Effects												
σ^2	2.530						2.524					
τ_{00}	2.361 $_{\text{Participant\_ID:Society}}$						2.285 $_{\text{Participant\_ID:Society}}$					
	0.035 $_{\text{Society}}$						0.035 $_{\text{Society}}$					
ICC	0.486						0.479					
N	3371 $_{\text{Participant\_ID}}$						3371 $_{\text{Participant\_ID}}$					
	13 $_{\text{Society}}$						13 $_{\text{Society}}$					
Observations	20226						20226					
Marginal R^2 / Conditional R^2	0.004 / 0.489						0.022 / 0.490					

Note. SPR = self-promotion and retaliation, DFR = defence of family reputation, SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient, *std. 95% CI* = 95% Confidence Interval of the standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Societal-level honour was the societal mean of perceived normative honour values across both the SPR and DFR facets of honour, while personal honour and normative honour (centred within society) were the individual-level unweighted means across the scale items.

3.3.2 Robustness check using factor scores for honour values

In this section, we present results from models using factor scores of honour values at the societal and individual level to predict cooperation and expectations of other's cooperation as robustness checks. The results of Model S17a replicated the positive association between societal-level honour and cooperation found in Model S15a. Additionally, using factor scores, societal-level honour also positively predicted expectations of other's cooperation (see Model S18a). At the individual-level, the results replicated the positive association between perceived normative honour values of self-promotion and retaliation (and persona values of defence of family reputation) and cooperation (see Model S17b), as well as the positive association between perceived normative values of defence of family reputation and expectations of other's cooperation (see Model S18b).

Table S17. Mixed-effects models with societal-level and individual-level honour values (factor scores) predicting individuals' own cooperative behaviours.

	Model S17a: Cooperation Behaviour						**Model S17b: Cooperation Behaviour**					
Predictors	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*
(Intercept)	6.217	0.068	92.092(11)	<0.001	/	/	6.235	0.121	51.333(23)	<0.001	/	/
Societal-level honour (fs)	**0.405**	**0.180**	**2.247(11)**	**0.046**	**0.066**	**[0.001, 0.130]**	0.408	0.182	2.238(11)	0.047	0.066	[0.001, 0.131]
Normative honour (SPR) (fs)							**0.148**	**0.072**	**2.049(3353)**	**0.041**	**0.040**	**[0.002, 0.078]**
Normative honour (DFR) (fs)							**0.016**	**0.060**	**0.269(3352)**	**0.788**	**0.006**	**[-0.037, 0.049]**
Personal honour (SPR) (fs)							**-0.072**	**0.076**	**-0.949(3352)**	**0.343**	**-0.015**	**[-0.045, 0.016]**
Personal honour (DFR) (fs)							**0.122**	**0.053**	**2.322(3351)**	**0.020**	**0.042**	**[0.007, 0.078]**
Partner gender [male]							-0.019	0.027	-0.725(16853)	0.468	-0.008	[-0.031, 0.014]
Partner gender [unknown]							-0.012	0.027	-0.437(16853)	0.662	-0.005	[-0.028, 0.018]
Participant gender [male]							0.119	0.061	1.943(3352)	0.052	0.052	[-0.000, 0.104]
Age							0.004	0.002	1.961(3353)	0.050	0.027	[0.000, 0.053]
Game order [SL-CG]							-0.478	0.061	-7.798(3354)	<0.001	-0.207	[-0.259, -0.155]
Random Effects												
σ^2	2.420						2.420					
τ_{00}	2.846 $_{\text{Participant\_ID:Society}}$						2.759 $_{\text{Participant\_ID:Society}}$					
	0.047 $_{\text{Society}}$						0.048 $_{\text{Society}}$					
ICC	0.545						0.537					
N	3371 $_{\text{Participant\_ID}}$						3371 $_{\text{Participant\_ID}}$					
	13 $_{\text{Society}}$						13 $_{\text{Society}}$					
Observations	20226						20226					
Marginal R^2 / Conditional R^2	0.004 / 0.546						0.022 / 0.547					

Note. fs = factor score, SPR = self-promotion and retaliation, DFR = defence of family reputation, SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient, *std. 95% CI* = 95% Confidence Interval of the standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Societal-level honour (fs) was the societal-level factor scores of perceived normative honour values across both the SPR and DFR facets of honour, while personal honour (fs) and normative honour (fs) were the individual-level factor scores.

Table S18. Mixed-effects models with societal-level and individual-level honour values (factor scores) predicting individuals' expectations of others' cooperation.

	Model S18a: Cooperation Expectation						**Model S18b: Cooperation Expectation**					
Predictors	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*
(Intercept)	5.965	0.053	112.808(11)	<0.001	/	/	5.923	0.107	55.288(31)	<0.001	/	/
Societal-level honour (fs)	**0.457**	**0.141**	**3.240(11)**	**0.008**	**0.077**	**[0.025, 0.129]**	0.453	0.141	3.217(11)	0.008	0.076	[0.024, 0.129]
Normative honour (SPR) (fs)							**0.115**	**0.067**	**1.715(3353)**	**0.086**	**0.032**	**[-0.005, 0.069]**
Normative honour (DFR) (fs)							**0.149**	**0.056**	**2.660(3353)**	**0.008**	**0.057**	**[0.015, 0.098]**
Personal honour (SPR) (fs)							-0.120	0.070	-1.700(3352)	0.089	-0.025	[-0.055, 0.004]
Personal honour (DFR) (fs)							0.126	0.049	2.584(3352)	0.010	0.045	[0.011, 0.080]
Partner gender [male]							0.174	0.027	6.342(16853)	<0.001	0.078	[0.054, 0.102]
Partner gender [unknown]							0.047	0.027	1.713(16853)	0.087	0.021	[-0.003, 0.045]
Participant gender [male]							0.055	0.057	0.963(3352)	0.335	0.025	[-0.026, 0.075]
Age							0.002	0.002	0.855(3354)	0.393	0.011	[-0.014, 0.037]
Game order [SL-CG]							-0.257	0.057	-4.526(3355)	<0.001	-0.116	[-0.166, -0.066]
Random Effects												
σ^2	2.530						2.524					
τ_{00}	2.361 $_{\text{Participant\_ID:Society}}$						2.289 $_{\text{Participant\_ID:Society}}$					
	0.026 $_{\text{Society}}$						0.026 $_{\text{Society}}$					
ICC	0.485						0.478					
N	3371 $_{\text{Participant\_ID}}$						3371 $_{\text{Participant\_ID}}$					
	13 $_{\text{Society}}$						13 $_{\text{Society}}$					
Observations	20226						20226					
Marginal R^2 / Conditional R^2	0.006 / 0.488						0.023 / 0.490					

Note. fs = factor score, SPR = self-promotion and retaliation, DFR = defence of family reputation, SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient, *std. 95% CI* = 95% Confidence Interval of the standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Societal-level honour (fs) was the societal-level factor scores of perceived normative honour values across both the SPR and DFR facets of honour, while personal honour (fs) and normative honour (fs) were the individual-level factor scores.

3.3.3 Societal-level honour as a potential moderator for personal honour values

We pre-registered to explore whether societal-level honour might moderate the relationship between personal honour values and cooperation. We found consistent support for the moderating role of societal-level honour in the association between personal values of both dimensions and cooperation, using observed scores and factor scores (see Table S19). Simple slope analyses revealed that in societies with lower societal-level honour, personally endorsing values of self-promotion and retaliation was associated with less cooperation, whereas in societies with higher societal-level honour, these negative associations became weaker, nonsignificant, and even positive (see Figure S3). However, the moderating effect was reversed for the defence of family reputation: in societies with lower societal-level honour, personally endorsing values of defence of family reputation was associated with more cooperation, whereas in societies with higher societal-level honour, these positive associations became weaker and nonsignificant (see Figure S3). These results indicated that personally endorsing the two facets of honour values had a more similar relationship with cooperation in societies with higher societal-level honour. However, in societies with lower societal-level honour, different mechanisms emerged for the two facets of personal honour values. In these contexts, personally endorsing self-promotion and retaliation may hinder cooperation, while personally endorsing defence of family reputation may play a more positive role in fostering cooperation.

Table S19. Mixed-effects models with individual-level honour values interacting with societal-level honour predicting cooperation.

	Cooperation Behaviour											
	Model S19a: Observed scores of honour values						**Model S19b: Factor scores of honour values**					
Predictors	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*
(Intercept)	4.347	0.668	6.506(27)	<0.001	/	/	6.272	0.122	51.553(23)	<0.001	/	/
Personal honour (SPR)	-0.800	0.290	-2.762(3349)	0.006	-0.016	[-0.049, 0.017]	-0.069	0.076	-0.904(3350)	0.366	-0.014	[-0.044, 0.017]
Personal honour (DFR)	0.980	0.340	2.883(11)	0.004	0.054	[0.017, 0.092]	0.121	0.052	2.313(3350)	0.021	0.042	[0.006, 0.078]
Societal-level honour	0.381	0.128	2.983(3349)	0.013	0.079	[0.021, 0.138]	0.409	0.182	2.252(11)	0.046	0.066	[0.001, 0.131]
Personal honour (SPR) × Soci. honour	**0.150**	**0.056**	**2.672(3349)**	**0.008**	**0.039**	**[0.010, 0.068]**	**0.491**	**0.168**	**2.916(3349)**	**0.004**	**0.038**	**[0.012, 0.063]**
Personal honour (DFR) × Soci. honour	**-0.169**	**0.066**	**-2.541(3349)**	**0.011**	**-0.039**	**[-0.069, -0.009]**	**-0.307**	**0.102**	**-2.999(3349)**	**0.003**	**-0.040**	**[-0.066, -0.014]**
Normative honour (SPR)	0.096	0.034	2.797(3349)	0.005	0.049	[0.015, 0.083]	0.156	0.072	2.161(3351)	0.031	0.042	[0.004, 0.081]
Normative honour (DFR)	0.062	0.040	1.554(3349)	0.120	0.030	[-0.008, 0.068]	0.010	0.060	0.167(3350)	0.867	0.004	[-0.040, 0.047]
Partner gender [male]	-0.019	0.027	-0.725(16853)	0.468	-0.008	[-0.031, 0.014]	-0.019	0.027	-0.725(16853)	0.468	-0.008	[-0.031, 0.014]
Partner gender [unknown]	-0.012	0.027	-0.437(16853)	0.662	-0.005	[-0.028, 0.018]	-0.012	0.027	-0.437(16853)	0.662	-0.005	[-0.028, 0.018]
Participant gender [male]	0.122	0.061	2.001(3350)	0.045	0.053	[0.001, 0.105]	0.129	0.061	2.097(3350)	0.036	0.056	[0.004, 0.108]
Age	0.003	0.002	1.140(3351)	0.254	0.016	[-0.011, 0.042]	0.003	0.002	1.529(3351)	0.126	0.021	[-0.006, 0.048]
Game order [SL-CG]	-0.475	0.061	-7.782(3352)	<0.001	-0.206	[-0.258, -0.154]	-0.484	0.061	-7.904(3352)	<0.001	-0.210	[-0.262, -0.158]
Random Effects												
σ^2	2.420						2.420					
τ_{00}	2.720 $_{\text{Participant\_ID:Society}}$						2.748 $_{\text{Participant\_ID:Society}}$					
	0.037 $_{\text{Society}}$						0.048 $_{\text{Society}}$					
ICC	0.533						0.536					
N	3371 $_{\text{Participant\_ID}}$						3371 $_{\text{Participant\_ID}}$					
	13 $_{\text{Society}}$						13 $_{\text{Society}}$					
Observations	20226						20226					
Marginal R^2 / Conditional R^2	0.031 / 0.547						0.024 / 0.547					

Note. SPR = self-promotion and retaliation, DFR = defence of family reputation, SL = step-level public goods game, CG = contest game, Soci. = Societal-level, *std. Beta* = standardized regression coefficient, *std. 95% CI* = 95% Confidence Interval of the standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Societal-level honour was the societal mean of perceived normative honour values across both the SPR and DFR facets of honour, while personal honour and normative honour (centred within society) were the individual-level unweighted means across the scale items.

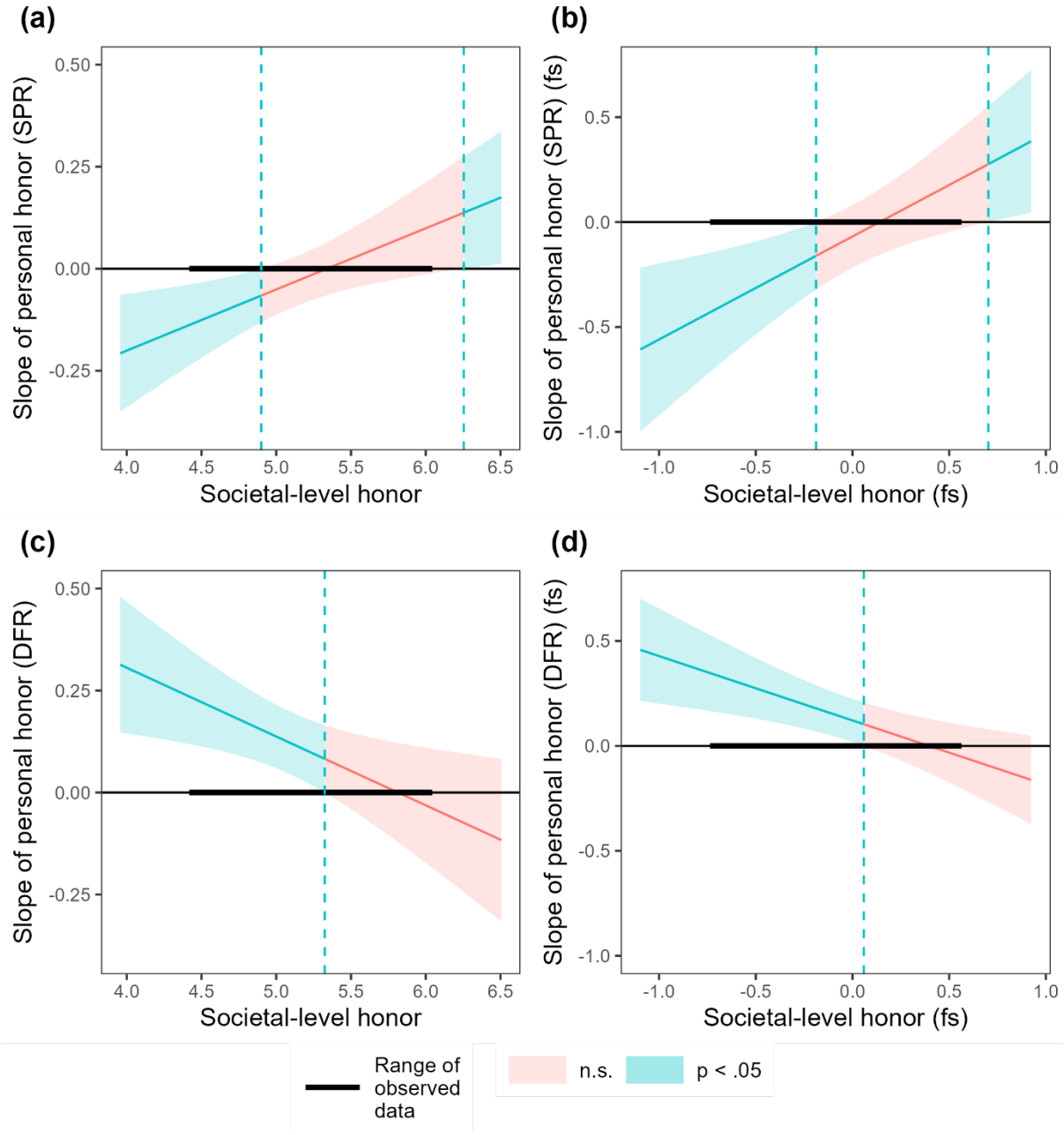

Figure S3. Johnson-Neyman plots for the interaction between personal honour values (self-promotion and retaliation, and defence of family reputation) and societal-level honour in predicting cooperation behaviour: (a) and (c) using observed scores for honour values, (b) and (d) using factor scores for honour values.

Note. SPR = self-promotion and retaliation, DFR = defence of family reputation, fs = factor scores. The x-axis shows the moderator societal-level honor, and y-axis shows the size of the estimated slope of each facet of personal honor values on cooperation behaviour. The range of observed scores of societal-level honor was [4.44, 6.03], and for factor scores, it was [-0.72, 0.55]. The solid line represents how the slope changes as the moderator (i.e., societal-level honor) increases. The shadow area represents the 95% confidence intervals around the slope estimate. The blue region marks the range of moderator values where the slope was statistically significant ($p < .05$): (a) outside the interval [4.90, 6.25], (b) outside the interval [-0.19, 0.70], (c) outside the interval [5.32, 8.43], (d) outside the interval [0.06, 1.31].

3.3.4 Contextual effects of honour on cooperation and expectations about other's cooperation

In this section, we report the results from additional analyses that were not pre-registered to explore the potential contextual effects of honour on cooperation and expectations about other's cooperation. As for competition (see Supplementary Section 3.2.4 for more information about contextual effects), we applied the same grand mean centring approach to the observed scores of perceived normative and personal honour values at the individual level, and added them (along with control variables such as participant age and gender, partner gender information, and game order) to Model S15a and S16a in Supplementary Section 3.3.1 to examine the contextual effect of societal-level perceived normative honour values on cooperation, controlling for individual level perceived normative and personal honour values.

The results showed that the association between societal mean perceived normative honour values and cooperation found in Model S15a or expectations of other's cooperation found in Model S16a both became nonsignificant after controlling for individual-level grand mean-centred perceived normative and personal honour values (see Model S20a and S20b). This suggested that for individuals with the same level of perceived normative and personal honour values, there was no evidence that those living in societies with higher societal mean perceived normative honour values would engage in greater cooperation or expect more cooperation from others. Comparing the *B* coefficients in Model S15b ($B = 0.381$, see Supplementary Section 3.3.1) and Model S20a ($B = 0.130$), 66% [= (0.381 – 0.130) / 0.381] of the variation in cooperation explained by societal-level honour could be explained by individual-level honour values, particularly personal endorsement of defence of family reputation ($\beta = 0.065$, $p = .002$) and perceived normative values of self-promotion and retaliation ($\beta = 0.052$, $p = .006$, see Table S20). Similarly, for expectations of other's

cooperation, comparing the B coefficients in Model S16b (B = 0.309, see Supplementary Section 3.3.1) and Model S20b (B = 0.082), 73% [= (0.309 – 0.082) / 0.309] of the variation explained by societal-level honour could be explained by individual-level honour values, including both perceived normative honour values (SPR: β = 0.036, p = .049; DFR: β = 0.077, p < .001) and personally endorsed honour values (SPR: β = –0.052, p = .003; DFR: β = 0.050, p = .012, see Table S20). These findings imply that the cultural contexts characterized by varying levels of honour value prevalence shape individual's engagement in interpersonal cooperation and trust primarily through their perceptions of the prescribed values and norms within those cultural contexts.

Table S20. Mixed-effects models with societal-level and individual-level perceived normative honour values (grand mean centred observed scores) predicting individuals' own cooperative behaviours and expectations of others' cooperation.

	Model S20a: Cooperation Behaviour						**Model S20b: Cooperation Expectation**					
Predictors	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*
(Intercept)	5.604	0.671	8.349(28)	<0.001	/	/	5.507	0.633	8.703(28)	<0.001	/	/
Societal-level honour	**0.130**	**0.128**	**1.020(12)**	**0.327**	**0.027**	**[-0.031, 0.085]**	**0.082**	**0.120**	**0.685(13)**	**0.506**	**0.018**	**[-0.039, 0.074]**
Normative honour (SPR)	0.095	0.034	2.764(3359)	0.006	0.052	[0.015, 0.088]	0.063	0.032	1.970(3360)	0.049	0.036	[0.000, 0.071]
Normative honour (DFR)	0.066	0.040	1.650(3361)	0.099	0.035	[-0.007, 0.076]	0.140	0.037	3.783(3361)	<0.001	0.077	[0.037, 0.117]
Personal honour (SPR)	-0.036	0.031	-1.155(3245)	0.248	-0.021	[-0.056, 0.014]	-0.085	0.029	-2.986(3254)	0.003	-0.052	[-0.085, -0.018]
Personal honour (DFR)	0.122	0.039	3.128(3357)	0.002	0.065	[0.024, 0.105]	0.092	0.036	2.521(3357)	0.012	0.050	[0.011, 0.090]
Partner gender [male]	-0.019	0.027	-0.725(16853)	0.468	-0.008	[-0.031, 0.014]	0.174	0.027	6.342(16853)	<0.001	0.078	[0.054, 0.102]
Partner gender [unknown]	-0.012	0.027	-0.437(16853)	0.662	-0.005	[-0.028, 0.018]	0.047	0.027	1.713(16853)	0.087	0.021	[-0.003, 0.045]
Participant gender [male]	0.113	0.061	1.849(3352)	0.065	0.049	[-0.003, 0.101]	0.057	0.057	1.000(3352)	0.318	0.026	[-0.025, 0.076]
Age	0.003	0.002	1.542(3354)	0.123	0.021	[-0.006, 0.047]	0.001	0.002	0.727(3354)	0.467	0.009	[-0.016, 0.035]
Game order [SL-CG]	-0.471	0.061	-7.716(3354)	<0.001	-0.204	[-0.256, -0.152]	-0.253	0.057	-4.455(3354)	<0.001	-0.114	[-0.164, -0.064]
Random Effects												
σ^2	2.420						2.524					
τ_{00}	2.727 $_{\text{Participant\_ID:Society}}$						2.285 $_{\text{Participant\_ID:Society}}$					
	0.033 $_{\text{Society}}$						0.030 $_{\text{Society}}$					
ICC	0.533						0.478					
N	3371 $_{\text{Participant\_ID}}$						3371 $_{\text{Participant\_ID}}$					
	13 $_{\text{Society}}$						13 $_{\text{Society}}$					
Observations	20226						20226					
Marginal R^2 / Conditional R^2	0.030 / 0.547						0.022 / 0.490					

Note. SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient, *std. 95% CI* = 95% Confidence Interval of the standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Societal-level honour was the societal mean of perceived normative honour values across both the self-promotion and retaliation, and the defence of family reputation facets of honour, while normative honour (centred at the grand mean) was the individual-level unweighted means across all the scale items measuring perceived normative honour values, including both the self-promotion and retaliation, and the defence of family reputation facets of honour.

3.3.5 Additional explanation for cooperation: Relational mobility

We pre-registered to test whether there are other cultural factors additional to honour values that may explain between-individuals level and between-societies level variation in cooperation. *Relational mobility* is a socio-ecological variable that represents how much freedom and opportunity a society affords individuals to choose and dispose of interpersonal relationships based on personal preference[8]. Low relational mobility societies are characterized by closed networks, and low possibility to change interpersonal relationships and groups. High relational mobility societies are characterized by plenty of opportunities to engage in new friendships based on personal preferences and choices. Past research has found higher cooperation in societies characterized by more flexible and fluid social relations, and that people who perceived their environment to have more opportunities to establish new relationships with strangers were generally more cooperative with strangers[12]. We therefore examined whether relational mobility could explain additional variation in cooperation beyond what was explained by honour values.

At the societal level, relational mobility explained significant variation in cooperation beyond societal-level honour (see Model S21a). At the individual level, relational mobility also explained additional variance in cooperation beyond honour values (see Models S21b). Relational mobility was associated with higher cooperation at both societal and individual level. Yet, these results were not replicated using factor scores for honour values and relational mobility (see Model S22a and S22b). The present dataset included only 13 societies, and the mixed-effects models incorporated two societal-level predictors (see Models S21a and S22a). The relatively small sample size at the societal-level may limit the statistical power and generalizability of these findings. These results suggested that relational mobility may provide additional explanation for cooperation beyond honour values,

particularly at the individual level, while interpretations of societal-level patterns should be made cautiously due to potential overfitting and limited degrees of freedom.

Table S21. Mixed-effects models with societal-level and individual-level honour values and relational mobility (observed scores) predicting cooperation.

	Model S21a: Cooperation Behaviour						**Model S21b: Cooperation Behaviour**					
Predictors	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*
(Intercept)	-0.174	1.771	-0.098(10)	0.924	/	/	-0.158	1.800	-0.088(34)	0.930	/	/
Societal-level honour	0.342	0.102	3.337(10)	0.008	0.071	[0.024, 0.119]	0.348	0.104	3.344(10)	0.008	0.073	[0.024, 0.121]
Societal-level RMOB	**1.231**	**0.467**	**2.635(10)**	**0.025**	**0.056**	**[0.009, 0.104]**	1.233	0.474	2.600(10)	0.027	0.056	[0.008, 0.105]
Normative honour (SPR)							0.103	0.034	2.982(3350)	0.003	0.052	[0.018, 0.086]
Normative honour (DFR)							0.049	0.040	1.227(3350)	0.220	0.024	[-0.014, 0.062]
Personal honour (SPR)							-0.015	0.032	-0.486(3350)	0.627	-0.008	[-0.042, 0.025]
Personal honour (DFR)							0.107	0.039	2.714(3350)	0.007	0.051	[0.014, 0.089]
Relational mobility							**0.139**	**0.059**	**2.379(3350)**	**0.017**	**0.033**	**[0.006, 0.061]**
Partner gender [male]							-0.019	0.027	-0.725(16853)	0.468	-0.008	[-0.031, 0.014]
Partner gender [unknown]							-0.012	0.027	-0.437(16853)	0.662	-0.005	[-0.028, 0.018]
Participant gender [male]							0.119	0.061	1.947(3351)	0.052	0.052	[-0.000, 0.104]
Age							0.003	0.002	1.557(3353)	0.120	0.021	[-0.005, 0.047]
Game order [SL-CG]							-0.473	0.061	-7.754(3355)	<0.001	-0.205	[-0.257, -0.153]
Random Effects												
σ^2	2.420						2.420					
τ_{00}	2.846 $_{\text{Participant\_ID:Society}}$						2.723 $_{\text{Participant\_ID:Society}}$					
	0.018 $_{\text{Society}}$						0.020 $_{\text{Society}}$					
ICC	0.542						0.531					
N	3371 $_{\text{Participant\_ID}}$						3371 $_{\text{Participant\_ID}}$					
	13 $_{\text{Society}}$						13 $_{\text{Society}}$					
Observations	20226						20226					
Marginal R^2 / Conditional R^2	0.009 / 0.546						0.034 / 0.547					

Note. RMOB = relational mobility, SPR = self-promotion and retaliation, DFR = defence of family reputation, SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient, *std. 95% CI* = 95% Confidence Interval of the standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Societal-level honour was the societal mean of perceived normative honour values across both the SPR and DFR facets of honour, and societal-level RMOB was the societal mean of relational mobility, while personal honour, normative honour and relational mobility (centred within society) were the individual-level unweighted means across the scale items.

Table S22. Mixed-effects models with societal-level and individual-level honour values and relational mobility (factor scores) predicting cooperation.

	Model S22a: Cooperation Behaviour						**Model S22b: Cooperation Behaviour**					
Predictors	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*
(Intercept)	6.217	0.061	101.297(10)	<0.001	/	/	6.234	0.118	52.736(24)	<0.001	/	/
Societal-level honour (fs)	0.321	0.170	1.890(10)	0.088	0.052	[-0.009, 0.114]	0.326	0.173	1.886(10)	0.089	0.053	[-0.010, 0.115]
Societal-level RMOB (fs)	**0.728**	**0.400**	**1.821(10)**	**0.099**	**0.050**	**[-0.011, 0.112]**	0.722	0.406	1.776(10)	0.106	0.050	[-0.013, 0.112]
Normative honour (SPR) (fs)							0.154	0.073	2.129(3352)	0.033	0.042	[0.003, 0.080]
Normative honour (DFR) (fs)							-0.000	0.061	-0.001(3351)	0.999	-0.000	[-0.044, 0.044]
Personal honour (SPR) (fs)							-0.059	0.077	-0.772(3350)	0.440	-0.012	[-0.043, 0.019]
Personal honour (DFR) (fs)							0.109	0.053	2.052(3351)	0.040	0.038	[0.002, 0.074]
Relational mobility (fs)							**0.188**	**0.135**	**1.394(3351)**	**0.163**	**0.020**	**[-0.008, 0.049]**
Partner gender [male]							-0.019	0.027	-0.725(16853)	0.468	-0.008	[-0.031, 0.014]
Partner gender [unknown]							-0.012	0.027	-0.437(16853)	0.662	-0.005	[-0.028, 0.018]
Participant gender [male]							0.124	0.062	2.012(3351)	0.044	0.054	[0.001, 0.106]
Age							0.004	0.002	1.961(3352)	0.050	0.027	[0.000, 0.053]
Game order [SL-CG]							-0.480	0.061	-7.827(3353)	<0.001	-0.208	[-0.260, -0.156]
Random Effects												
σ^2	2.420						2.420					
τ_{00}	2.846 $_{\text{Participant\_ID:Society}}$						2.758 $_{\text{Participant\_ID:Society}}$					
	0.036 $_{\text{Society}}$						0.038 $_{\text{Society}}$					
ICC	0.544						0.536					
N	3371 $_{\text{Participant\_ID}}$						3371 $_{\text{Participant\_ID}}$					
	13 $_{\text{Society}}$						13 $_{\text{Society}}$					
Observations	20226						20226					
Marginal R^2 / Conditional R^2	0.007 / 0.547						0.024 / 0.547					

Note. fs = factor score, RMOB = relational mobility, SPR = self-promotion and retaliation, DFR = defence of family reputation, SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient, *std. 95% CI* = 95% Confidence Interval of the standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Societal-level honour (fs) was the societal-level factor scores of perceived normative honour values across both the SPR and DFR facets of honour, and societal-level RMOB (fs) was the societal-level factor scores of relational mobility, while personal honour (fs), normative honour (fs) and relational mobility (fs) were the individual-level factor scores.

3.3.6 Other societal-level indicators and cooperation

In this section, we report the results of a series of mixed effects models, where each model included one societal-level indicator predicting cooperation (see Table S23). The same set of societal-level indicators were examined in relation to cooperation that we had previously examined in relation to competition (see Section 3.2.5 for societal-level indicators and competition, and Table S13 for more information about the operationalization of these societal-level indicators). The results showed that among all these societal-level indicators, only market competitiveness was negatively associated with cooperation ($\beta = -.077$, $p = .022$, see Table S23). Interestingly, intercorrelations showed that market competitiveness was the strongest societal-level indicator that negatively correlated with societal-level honour, compared to other indicators (see Figure S4a and S4b). The Global Competitiveness Index (GCI) that has been used to operationalize market competitiveness is a highly complex indicator assessing the ability of countries to provide high levels of prosperity to their citizens. Thus, these findings seem to suggest that greater interpersonal cooperation occurred in harsher environments with lower economic productivity and prosperity, where a stronger culture of honour may exist. Considering the results from both competition and cooperation, our findings may imply that harsher environments may require individuals to develop both the ability to cooperate and compete for scarce resources[13] (see Section 3.2.6 for analyses on the association between other societal-level indicators and competition).

Table S23. A series of mixed-effects models for each societal-level indicator predicting cooperation in separate models.

		Models S23a-S23n: Cooperation Behaviour								
#	**Societal-level indicator**	***B***	***SE***	***t*(*df*)**	***p***	***std. Beta***	***std. 95%CI***	$N_{society}$	$N_{participant}$	$N_{observation}$
	Economic indicators									
a	GDP per capita	-0.112	0.082	-1.363(10)	0.203	-0.046	[-0.113, 0.020]	12	3126	18756
b	GNI	-0.134	0.079	-1.703(10)	0.119	-0.056	[-0.120, 0.008]	12	3126	18756
c	Human development index	-0.101	0.084	-1.211(10)	0.254	-0.042	[-0.110, 0.026]	12	3126	18756
d	Gender inequality	0.112	0.082	1.360(10)	0.204	0.047	[-0.021, 0.114]	12	3126	18756
	Institutions									
e	Government effectiveness	-0.121	0.081	-1.490(10)	0.167	-0.050	[-0.116, 0.016]	12	3126	18756
f	Rule of law	-0.035	0.089	-0.393(10)	0.703	-0.014	[-0.087, 0.058]	12	3126	18756
g	Political stability	0.015	0.089	0.166(10)	0.871	0.006	[-0.067, 0.079]	12	3126	18756
h	Corruption control	-0.048	0.088	-0.543(10)	0.599	-0.020	[-0.092, 0.052]	12	3126	18756
i	Corruption perceptions index	-0.159	0.074	-2.158(10)	0.056	-0.066	[-0.126, -0.006]	12	3126	18756
j	Market competitiveness	-0.184*	0.068	-2.717(10)	0.022	-0.077	[-0.132, -0.021]	12	3126	18756
	Historical and ecological threats									
k	Historical prevalence of infectious disease	0.040	0.089	0.454(10)	0.660	0.017	[-0.055, 0.089]	12	3126	18756
l	World risk index	0.041	0.089	0.463(10)	0.653	0.017	[-0.055, 0.089]	12	3126	18756
m	Exposure	-0.125	0.080	-1.557(10)	0.150	-0.052	[-0.117, 0.013]	12	3126	18756
n	Vulnerability	0.127	0.080	1.591(10)	0.143	0.053	[-0.012, 0.119]	12	3126	18756

Note. std. Beta = standardized regression coefficient, *std. 95% CI* = 95% Confidence Interval of the standardized regression coefficient, $N_{society}$ = number of societies, $N_{participant}$ = number of participants, $N_{observation}$ = number of observations at the decision level. Unstandardized regression coefficients (*B*) were marked with an asterisk if they were significant at the 0.05 level. See Table S13 for the operationalization for each societal-level indicator.

3.3.7 Re-analyses of existing datasets on cooperation

As pre-registered, we conducted secondary analyses of existing datasets to explore whether societal-level honour relates to cooperation versus non-cooperation in situations where non-cooperation can always yield the best outcome for an individual regardless of what others do (i.e., prisoner's dilemma, public goods dilemma). We applied societal mean perceived normative honour values as a societal-level indicator to predict (a) study-level mean cooperation rates in mixed-effects meta-regression models, and (b) individual's cooperation decisions and expectations of others' cooperation in mixed-effects linear regression models across societies. To do so, societal-level honour indicators (operationalized as the societal mean perceived normative honour values) were retrieved from Study 2 of a recent paper[6] [originally cited as Kirchner-Häusler et al. (in preparation) in the pre-registration], which used the same measurement tool to assess perceived normative honour values across diverse samples, including participants beyond university students, varying by age and gender. In their study, two items were initially used to assess perceived normative honour values but were not provided in their final dataset based on model selection results (i.e., "*People must always be ready to defend their honour*", and "*It is important to promote oneself to others*").

We then retrieved (a) study-level (and treatment-level) data on mean cooperation rates from samples in social dilemma studies using prisoner's dilemmas and public goods dilemmas, conducted in eight societies (Turkey, Greece, Italy, Spain, Japan, South Korea, the U.K., the U.S.) in the past literature from a meta-analysis conducted by Spadaro and colleagues[14], and (b) individual decisions on cooperation (measured using a prisoner's dilemma) and expectations about other's cooperation across nine societies (Egypt, Turkey, Greece, Italy, Spain, Japan, South Korea, the U.K., the U.S.) from an empirical study

conducted by Romano and colleagues[12]. These were the only societies that overlapped with the societies in the societal-level honour indicator dataset.

We started by exploring whether there was cross-societal variation in study-level (and treatment-level) mean cooperation rates among the eight societies that we selected from the meta-analysis conducted by Spadaro and colleagues[14] to match with the societies with honour values available. We conducted multilevel meta-analyses to evaluate variance at the between-societies level by fitting a baseline model with society as a random intercept and a second model with the between-societies variance set to zero. Model comparison results revealed that removing the between-societies level variance even resulted in a slightly higher AIC and BIC, with a non-significant likelihood ratio test (LRT = 3.37, p = .067), suggesting that between-societies level variance was not a strong contributor to the overall variability in effect sizes. We therefore ran a mixed-effects meta-regression model with study as the only random intercept, using societal mean perceived normative honour values to predict study-level (and treatment-level) logit-transformed cooperation rates. The model controlled for a set of study characteristics (i.e., symmetry, repetitions, group size, K index, communication, decision protocol, sanction, choice options, source of society, and period of cooperation)[14]. However, we found no support for the association between social-level honour and cooperation (b = 0.061, p = .487, Δ pseudo R^2 = 0%, see Table S24).

Running a multilevel meta-analysis with only eight observations for societies, included as a random intercept, risks producing biased variance estimates and inflated Type I error, making the results less reliable and generalizable. To address this limitation, we conducted a non-pre-registered robustness check using a larger sample of societies from the meta-analytic dataset, categorizing them into five world regions [i.e., *Middle-Eastern*: Iran, Israel, Oman, Palestine (Palestinian Territories), Saudi Arabia, Turkey; *Latin American*: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Guatemala, Mexico, Peru, Uruguay,

Venezuela; *South Asian*: India; *East Asian*: China, Hong Kong (a Special Administrative Region of China), Japan, South Korea, Taiwan; *Anglo-Western*: Australia, Canada, United Kingdom, New Zealand, United States]. Past literature has found honour being a prevalent cultural value in world regions such as Middle East, Latin America and South Asia. We therefore recoded society into three regions including East Asia, Anglo-West, and a third category representing honour cultures. We included two dummy variables for region as predictors in the mixed-effects meta-regression model (dummy 1: honour cultures = 0, East Asia = 1; dummy 2: honour cultures = 0, Anglo-West = 1). However, we still found no evidence that region was associated with cooperation (dummy 1: $b = -0.061$, $p = .599$; dummy 2, $b = 0.009$, $p = .935$, Δ pseudo $R^2 = 0\%$, see Table S25).

Lastly, we explored whether there was cross-society variation in cooperation with unrelated others from one's own society and expectations about other's cooperation among the nine societies retrieved from the study conducted by Romano and colleagues[12]. We assessed the between-society variance on cooperation and expectations by first fitting models with participant as a random intercept, then adding society to the random intercept, and comparing these models to see if the added variance improved the model fit. Results showed a significant improvement in model fit on cooperation ($\chi^2 = 75.04$, $p < .001$) and expectation ($\chi^2 = 73.36$, $p < .001$), indicating the existence of cross-society variation in cooperation and expectations. We then applied societal mean perceived normative honour values from Study 2 of a recent paper[6] to predict cooperation and expectation of other's cooperation in mixed effect models, with participant and society entered as random intercepts. Results showed that societal mean perceived normative honour values did not significantly predict cooperation or expectation towards strangers from one's own society (ps > .695, see Table S26). All together, these findings suggested that societal-level honour was not linked to cooperation (or

expectations of others' cooperation) measured in prisoner's dilemmas and continuous public goods games.

Table S24. Mixed-effects meta-regression model with societal-level honour (societal mean perceived normative honour values) predicting study-level (and treatment-level) logit-transformed cooperation rates.

	Model S24: Logit-transformed cooperation rates				
Predictors	*B*	*SE*	*95% CI*	*t*	*p*
(Intercept)	-0.667	0.187	-1.034 – -0.301	-3.570	<0.001
Symmetry [mixed]	0.038	0.245	-0.444 – 0.519	0.153	0.878
Symmetry [symmetric]	0.257	0.135	-0.007 – 0.521	1.910	0.056
Repetitions [mixed]	-0.152	0.267	-0.675 – 0.371	-0.569	0.569
Repetitions [one-shot]	0.012	0.055	-0.096 – 0.119	0.213	0.832
Group size log	-0.050	0.055	-0.157 – 0.058	-0.901	0.368
K Index	**0.792**	**0.118**	**0.562 – 1.023**	**6.738**	**<0.001**
Communication [mixed]	0.524	0.295	-0.055 – 1.103	1.776	0.076
Communication [present]	**0.513**	**0.072**	**0.371 – -0.655**	**7.085**	**<0.001**
Decision protocol [mixed]	-0.112	0.205	-0.514 – 0.290	-0.546	0.585
Decision protocol [simultaneous]	-0.046	0.096	-0.233 – 0.142	-0.479	0.632
Sanction [mixed]	0.335	0.233	-0.121 – 0.791	1.441	0.150
Sanction [present]	**0.508**	**0.072**	**0.367 – 0.648**	**7.077**	**<0.001**
Choice options [continuous]	0.034	0.064	-0.091 – 0.159	0.535	0.593
Source of society [different societies]	-0.328	0.284	-0.884 – 0.229	-1.156	0.248
Source of society [all authors]	-0.094	0.072	-0.236 – 0.048	-1.298	0.195
Source of society [most authors]	0.308	0.287	-0.255 – 0.872	1.074	0.283
Period of cooperation [first]	0.207	0.172	-0.130 – 0.544	1.205	0.229
Society-level honour	0.061	0.088	-0.111 – 0.234	0.696	0.487
Model Statistics					
$Q_{residual}(df)$	26114.83 (1151)*				
$F_{moderators}(df1, df2)$	8.97 (18, 1151)*				
τ^2	0.202 $_{\text{Effect Size:Study}}$				
	0.318 $_{\text{Study}}$				
I^2: between-study level (%)	37.75				
I^2: within-study level (%)	59.31				
N	1170 $_{\text{Effect Size}}$				
	740 $_{\text{Study}}$				

Note. Group size log, K index and societal-level honour are continuous variables, others are dummy variables. The reference level for symmetry was asymmetric, for repetitions was repeated, for communication was absent, for decision protocol was sequential, for sanction was absent, for choice options was dichotomous, for source of society was specified in the text, and for period of cooperation was from all periods. See the meta-analysis conducted by Spadaro and colleagues[14] for more information about the coding of these study characteristics. Effect Size: Study = effect sizes were nested within studies.

Table S25. Mixed-effects meta-regression model with region predicting study-level (and treatment-level) logit-transformed cooperation rates.

	Model S25: Logit-transformed cooperation rates				
Predictors	*B*	*SE*	*95% CI*	*t*	*p*
(Intercept)	-0.502	0.190	-0.876 – -0.129	-2.641	0.008
Symmetry [mixed]	-0.085	0.219	-0.515 – 0.344	-0.389	0.697
Symmetry [yes]	0.098	0.117	-0.131 – 0.326	0.837	0.403
Repetitions [mixed]	0.025	0.228	-0.422 – 0.472	0.110	0.913
Repetitions [one-shot]	0.018	0.048	-0.076 – 0.113	0.378	0.705
Group size log	-0.041	0.047	-0.134 – 0.052	-0.873	0.383
K Index	**0.746**	**0.108**	**0.533 – 0.959**	**6.880**	**<0.001**
Communication [mixed]	**0.575**	**0.235**	**0.113 – 1.037**	**2.442**	**0.015**
Communication [present]	**0.494**	**0.070**	**0.358 – 0.631**	**7.090**	**<0.001**
Decision protocol [mixed]	-0.185	0.180	-0.537 – 0.168	-1.028	0.304
Decision protocol [simultaneous]	-0.100	0.088	-0.273 – 0.073	-1.137	0.256
Sanction [mixed]	0.096	0.193	-0.283 – 0.475	0.497	0.619
Sanction [present]	**0.485**	**0.060**	**0.368 – 0.602**	**8.140**	**<0.001**
Choice options [continuous]	0.088	0.056	-0.022 – 0.197	1.576	0.115
Source of society [different societies]	-0.378	0.271	-0.910 – 0.153	-1.395	0.163
Source of society [all authors]	-0.067	0.066	-0.197 – 0.063	-1.011	0.312
Source of society [most authors]	0.197	0.258	-0.309 – 0.702	0.764	0.445
Period of cooperation [first]	0.155	0.156	-0.150 – 0.460	0.994	0.320
Region [East Asia]	-0.061	0.116	-0.288 – 0.166	-0.527	0.599
Region [Anglo West]	0.009	0.107	-0.200 – 0.218	0.082	0.935
Model Statistics					
$Q_{residual}(df)$	36810.05 (1343)*				
$F_{moderators}(df1, df2)$	9.54 (19, 1343)*				
τ^2	0.197 $_{EffectSize:Study}$				
	0.284 $_{Study}$				
I^2: between-study level (%)	39.93				
I^2: within-study level (%)	57.56				
N	1363 $_{EffectSize}$				
	880 $_{Study}$				

Note. Group size log, K index and societal-level honour are continuous variables, others are dummy variables. The reference level for symmetry was asymmetric, for repetitions was repeated, for communication was absent, for decision protocol was sequential, for sanction was absent, for choice options was dichotomous, for source of society was specified in the text, and for period of cooperation was from all periods, for region was societies representing honour cultures. See the meta-analysis conducted by Spadaro and colleagues[14] for more information about the coding of these study characteristics. Effect Size: Study = effect sizes were nested within studies.

Table S26. Mixed-effects models with societal-level honour (societal mean perceived normative honour values) predicting cooperation with unrelated others from one's own society and expectations about other's cooperation.

	Model S26a: Cooperation Behaviour						**Model S26b: Cooperation Expectation**					
Predictors	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*	*B*	*SE*	*t*(*df*)	*p*	*std. Beta*	*std. 95% CI*
(Intercept)	4.356	0.158	27.503(7)	<0.001	/	/	4.241	0.155	27.320(7)	<0.001	/	/
Society-level honour	0.073	0.186	0.392(7)	0.707	0.021	[-0.107, 0.149]	-0.014	0.183	-0.078(7)	0.940	-0.004	[-0.134, 0.126]
Random Effects												
σ^2	2.099						2.126					
τ_{00}	5.016 $_{\text{Participant\_ID:Society}}$						4.486 $_{\text{Participant\_ID:Society}}$					
	0.186 $_{\text{Society}}$						0.180 $_{\text{Society}}$					
ICC	0.713						0.687					
N	3872 $_{\text{Participant\_ID}}$						3872 $_{\text{Participant\_ID}}$					
	9 $_{\text{Society}}$						9 $_{\text{Society}}$					
Observations	15240						15240					
Marginal R^2 / Conditional R^2	0.000 / 0.713						0.000 / 0.687					

Note. *std. Beta* = standardized regression coefficient. Societal-level honour was the societal mean of perceived normative honour values across both the SPR and DFR facets of honour.

3.3.8 Honour and coordinative decisions (contributing 8 or 6 MUs)

In this section, we present the results from models exploring the association between societal-level honour (see Model S27a and S27c) or individual-level honour values (see Model S27b and S27d) and the likelihood of contributing 8 MUs or contributing 6 MUs, using both observed scores and factor scores of honour values (Table S27-S28). Although society was removed from the models as a random intercept due to statistically insignificant variance at the between-society level, we still found that societal-level honour was positively associated with the likelihood of contributing 8 MUs (see Model S27a and Model S28a). Perceived normative values of defence of family reputation consistently positively predicted the likelihood of contributing 8 MUs (see Model S27b and S28b), but not 6 MUs (see Model S27d and S28d). However, perceived normative values of self-promotion and retaliation were not associated with contributing either 8 or 6 MUs. Personal values of defence of family reputation consistently positively predicted the likelihood of contributing 6 MUs (see Model S27d and S28d), but not with 8 MUs (see Model S27b and S28b). In contrast, personally endorsing values of self-promotion and retaliation consistently and negatively predicted the likelihood of contributing either 8 or 6 MUs.

Table S27. Generalized linear mixed models with personal and perceived normative honour values (observed scores) predicting the likelihood of contributing 8 MUs or 6 MUs.

	Model S27a: Contribute 8 MUs			**Model S27b: Contribute 8 MUs**			**Model S27c: Contribute 6 MUs**			**Model S27d: Contribute 6 MUs**		
Predictors	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*
(Intercept)	0.102	0.094 – 0.112	<0.001	0.113	0.098 – 0.131	<0.001	0.182	0.171 – 0.194	<0.001	0.169	0.151 – 0.190	<0.001
Societal-level honour	**1.138**	**1.055 – 1.227**	**0.001**	1.145	1.063 – 1.233	<0.001	**0.994**	**0.937 – 1.055**	**0.841**	0.996	0.939 – 1.057	0.893
Normative honour (SPR)				**1.039**	**0.947 – 1.141**	**0.419**				**1.010**	**0.938 – 1.089**	**0.785**
Normative honour (DFR)				**1.300**	**1.168 – 1.446**	**<0.001**				**1.052**	**0.968 – 1.143**	**0.230**
Personal honour (SPR)				**0.837**	**0.765 – 0.915**	**<0.001**				**0.881**	**0.820 – 0.947**	**0.001**
Personal honour (DFR)				**1.006**	**0.909 – 1.115**	**0.904**				**1.137**	**1.048 – 1.233**	**0.002**
Partner gender [male]				0.982	0.885 – 1.089	0.730				0.955	0.870 – 1.047	0.323
Partner gender [unknown]				0.934	0.841 – 1.037	0.200				0.984	0.897 – 1.078	0.725
Participant gender [male]				1.271	1.101 – 1.467	0.001				1.011	0.902 – 1.133	0.852
Age				1.056	0.982 – 1.136	0.140				1.035	0.977 – 1.096	0.247
Game order [SL-CG]				0.684	0.593 – 0.790	<0.001				1.187	1.059 – 1.329	0.003
Random Effects												
σ^2	3.290			3.290			3.29			3.290		
τ_{00}	2.488 $_{Participant\_ID}$			2.367 $_{Participant\_ID}$			1.420 $_{Participant\_ID}$			1.395 $_{Participant\_ID}$		
ICC	0.431			0.418			0.301			0.298		
N	3371 $_{Participant\_ID}$			3371 $_{Participant\_ID}$			3371 $_{Participant\_ID}$			3371 $_{Participant\_ID}$		
Observations	20226			20226			20226			20226		
Marginal R^2 / Conditional R^2	0.003 / 0.432			0.027 / 0.434			0.000 / 0.301			0.008 / 0.303		

Note. SPR = self-promotion and retaliation, DFR = defence of family reputation, SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Societal-level honour was the societal mean of perceived normative honour values across both the SPR and DFR facets of honour, while personal honour and normative honour (centred within society) were the individual-level unweighted means across the scale items. Society was not entered to the models as a random intercept due to statistically insignificant variance at the between-society level.

Table S28. Generalized linear mixed models with personal and perceived normative honour values (factor scores) predicting the likelihood of contributing 8 MUs or 6 MUs.

	Model S28a: Contribute 8 MUs			**Model S28b: Contribute 8 MUs**			**Model S28c: Contribute 6 MUs**			**Model S28d: Contribute 6 MUs**		
Predictors	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*
(Intercept)	0.102	0.094 – 0.112	<0.001	0.114	0.098 – 0.131	<0.001	0.182	0.171 – 0.194	<0.001	0.170	0.151 – 0.191	<0.001
Societal-level honour (fs)	**1.547**	**1.274 – 1.878**	**<0.001**	1.542	1.274 – 1.866	<0.001	**1.029**	**0.884 – 1.198**	**0.709**	1.025	0.881 – 1.193	0.750
Normative honour (SPR) (fs)				**1.089**	**0.921 – 1.288**	**0.318**				**1.044**	**0.913 – 1.193**	**0.531**
Normative honour (DFR) (fs)				**1.352**	**1.173 – 1.559**	**<0.001**				**1.078**	**0.964 – 1.205**	**0.190**
Personal honour (SPR) (fs)				**0.768**	**0.644 – 0.915**	**0.003**				**0.865**	**0.751 – 0.996**	**0.044**
Personal honour (DFR) (fs)				**1.054**	**0.933 – 1.191**	**0.398**				**1.198**	**1.086 – 1.321**	**<0.001**
Partner gender [male]				0.982	0.885 – 1.089	0.730				0.954	0.870 – 1.047	0.323
Partner gender [unknown]				0.934	0.841 – 1.037	0.200				0.984	0.897 – 1.078	0.725
Participant gender [male]				1.261	1.093 – 1.456	0.001				1.005	0.897 – 1.126	0.927
Age				1.050	0.977 – 1.129	0.184				1.028	0.971 – 1.089	0.341
Game order [SL-CG]				0.684	0.593 – 0.789	<0.001				1.186	1.059 – 1.329	0.003
Random Effects												
σ^2	3.290			3.290			3.290			3.290		
τ_{00}	2.481 $_{\text{Participant\_ID}}$			2.348 $_{\text{Participant\_ID}}$			1.420 $_{\text{Participant\_ID}}$			1.389 $_{\text{Participant\_ID}}$		
ICC	0.430			0.416			0.301			0.297		
N	3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$		
Observations	20226			20226			20226			20226		
Marginal R^2 / Conditional R^2	0.005 / 0.433			0.031 / 0.435			0.000 / 0.302			0.010 / 0.304		

Note. fs = factor score, SPR = self-promotion and retaliation, DFR = defence of family reputation, SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Societal-level honour (fs) was the societal-level factor scores of perceived normative honour values across both the SPR and DFR facets of honour, while personal honour (fs) and normative honour (fs) were the individual-level factor scores. Society was not entered to the models as a random intercept due to statistically insignificant variance at the between-society level.

3.4 Honour and anticipation of coordination success

In this section, we present the results from additional exploratory analyses examining the sum of an individual's own investment and expected partner's investment in a given round. In the step-level public goods game, we categorized a given game round as *efficient coordination* if the expected sum contribution reached the second provision point (i.e., 16 MUs), as *less-efficient* coordination if it only reaches the first provision point (i.e., 12 MUs), and otherwise *failed coordination*.

We present the results from models exploring the association between societal-level honour or individual-level honour values and the occurrence of anticipated success of efficient coordination or less-efficient coordination (i.e., the likelihood of a game round being categorized as efficient coordination success or less-efficient coordination success). Although society was removed as a random intercept in models testing efficient coordination success due to statistically nonsignificant variance at the between-society level, we consistently found that societal-level honour positively predicted the occurrence of efficient coordination success using both observed scores (see Model S29a) and factor scores (see Model S30a) of honour values. However, no association was found between societal-level honour and less-efficient coordination success (see Model S29c and S30c). At the individual-level, perceived normative values of defence of family reputation were positively associated with the occurrence of anticipated less-efficient coordination success (i.e., reaching the first provision point, see Model S29d and S30d). Similarly, personally endorsing values of defence of family reputation was positively associated with anticipated coordination success, but specifically for efficient coordination (i.e., reaching the second provision point, see Model S29b and S30b). Conversely, personal values of self-promotion and retaliation were consistently negatively associated with the occurrence of less-efficient coordination success (see Model S29d and S30d).

Table S29. Generalized linear mixed models with personal and perceived normative honour values (observed scores) predicting the likelihood of a game round being categorized as anticipated success of efficient or less-efficient coordination.

	Model S29a: Efficient coordination			**Model S29b: Efficient coordination**			**Model S29c: Less-efficient coordination**			**Model S29d: Less-efficient coordination**		
Predictors	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*
(Intercept)	0.063	0.054 – 0.073	<0.001	0.034	0.026 – 0.044	<0.001	0.492	0.448 – 0.539	<0.001	0.581	0.497 – 0.678	<0.001
Societal-level honour	**1.418**	**1.256 – 1.600**	**<0.001**	1.462	1.301 – 1.643	<0.001	**1.011**	**0.919 – 1.113**	**0.816**	1.001	0.903 – 1.109	0.988
Normative honour (SPR)				**1.151**	**0.996 – 1.329**	**0.056**				**1.048**	**0.964 – 1.139**	**0.273**
Normative honour (DFR)				**1.095**	**0.932 – 1.285**	**0.270**				**1.204**	**1.097 – 1.322**	**<0.001**
Personal honour (SPR)				**0.923**	**0.803 – 1.061**	**0.258**				**0.838**	**0.773 – 0.909**	**<0.001**
Personal honour (DFR)				**1.190**	**1.017 – 1.392**	**0.030**				**1.063**	**0.970 – 1.164**	**0.190**
Cooperation deviation type [conditional cooperation]				6.873	5.881 – 8.032	<0.001				0.670	0.605 – 0.741	<0.001
Cooperation deviation type [unconditional cooperation]				1.171	0.998 – 1.373	0.052				1.148	1.043 – 1.263	0.005
Partner gender [male]				1.333	1.183 – 1.502	<0.001				0.936	0.863 – 1.017	0.117
Partner gender [unknown]				1.061	0.941 – 1.197	0.335				0.998	0.920 – 1.083	0.961
Participant gender [male]				1.284	1.026 – 1.607	0.029				1.000	0.880 – 1.137	0.999
Age				1.033	0.921 – 1.158	0.581				0.955	0.896 – 1.020	0.167
Game order [SL-CG]				0.450	0.359 – 0.564	<0.001				0.879	0.774 – 0.999	0.049
Random Effects												
σ^2	3.290			3.290			3.290			3.290		
τ_{00}	7.745 $_{\text{Participant\_ID}}$			6.982 $_{\text{Participant\_ID}}$			2.545 $_{\text{Participant\_ID:Society}}$			2.473 $_{\text{Participant\_ID:Society}}$		
	N/A			N/A			0.014 $_{\text{Society}}$			0.019 $_{\text{Society}}$		
ICC	0.702			0.680			0.438			0.431		
N	3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$		
	N/A			N/A			13 $_{\text{Society}}$			13 $_{\text{Society}}$		
Observations	20226			20226			20226			20226		
Marginal R^2 / Conditional R^2	0.010 / 0.705			0.104 / 0.713			0.000 / 0.438			0.020 / 0.442		

Note. SPR = self-promotion and retaliation, DFR = defence of family reputation, Cooperation deviation type = the type of deviations in an individual's own cooperation from expectations of other's cooperation, SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient. The reference level for cooperation deviation type was [underinvested cooperation], for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Cooperation deviation type was controlled in the model. Societal-level honour was the societal mean of perceived normative honour values across both the SPR and DFR facets of honour, while personal honour and normative honour (centred within society) were the individual-level unweighted means across the scale items. Society was not entered to the models predicting the likelihood of efficient competition as a random intercept due to statistically insignificant variance at the between-society level.

Table S30. Generalized linear mixed models with personal and perceived normative honour values (factor scores) predicting the likelihood of a game round being categorized as anticipated success of efficient or less-efficient coordination.

	Model S30a: Efficient coordination			**Model S30b: Efficient coordination**			**Model S30c: Less-efficient coordination**			**Model S30d: Less-efficient coordination**		
Predictors	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*
(Intercept)	0.062	0.054 – 0.073	<0.001	0.034	0.026 – 0.043	<0.001	0.491	0.451 – 0.536	<0.001	0.581	0.500 – 0.676	<0.001
Societal-level honour (fs)	**2.459**	**1.805 – 3.350**	**<0.001**	2.473	1.832 – 3.336	<0.001	**1.175**	**0.934 – 1.478**	**0.169**	1.155	0.903 – 1.476	0.251
Normative honour (SPR) (fs)				**1.234**	**0.952 – 1.601**	**0.112**				**1.094**	**0.942 – 1.272**	**0.240**
Normative honour (DFR) (fs)				**1.040**	**0.837 – 1.293**	**0.722**				**1.242**	**1.095 – 1.408**	**0.001**
Personal honour (SPR) (fs)				**0.911**	**0.693 – 1.199**	**0.506**				**0.773**	**0.660 – 0.905**	**0.001**
Personal honour (DFR) (fs)				**1.224**	**1.013 – 1.480**	**0.036**				**1.103**	**0.989 – 1.230**	**0.079**
Cooperation deviation type [conditional cooperation]				6.842	5.855 – 7.996	<0.001				0.669	0.605 – 0.740	<0.001
Cooperation deviation type [unconditional cooperation]				1.176	1.003 – 1.379	0.046				1.151	1.046 – 1.266	0.004
Partner gender [male]				1.332	1.182 – 1.501	<0.001				0.937	0.863 – 1.017	0.118
Partner gender [unknown]				1.060	0.940 – 1.196	0.341				0.998	0.920 – 1.083	0.962
Participant gender [male]				1.290	1.030 – 1.617	0.027				0.997	0.877 – 1.134	0.968
Age				1.036	0.924 – 1.162	0.541				0.953	0.893 – 1.017	0.147
Game order [SL-CG]				0.447	0.357 – 0.561	<0.001				0.878	0.773 – 0.998	0.046
Random Effects												
σ^2	3.290			3.290			3.290			3.290		
τ_{00}	7.746 $_{\text{Participant\_ID}}$			7.061 $_{\text{Participant\_ID}}$			2.546 $_{\text{Participant\_ID:Society}}$			2.466 $_{\text{Participant\_ID:Society}}$		
	N/A			N/A			0.011 $_{\text{Society}}$			0.015 $_{\text{Society}}$		
ICC	0.702			0.682			0.437			0.430		
N	3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$		
	N/A			N/A			13 $_{\text{Society}}$			13 $_{\text{Society}}$		
Observations	20226			20226			20226			20226		
Marginal R^2 / Conditional R^2	0.010 / 0.705			0.101 / 0.714			0.001 / 0.438			0.022 / 0.442		

Note. fs = factor score, SPR = self-promotion and retaliation, DFR = defence of family reputation, Cooperation deviation type = the type of deviations in an individual's own cooperation from expectations of other's cooperation, SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient. The reference level for cooperation deviation type was [underinvested cooperation], for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Cooperation deviation type was controlled in the model. Societal-level honour (fs) was the societal-level factor scores of perceived normative honour values across both the SPR and DFR facets of honour, while personal honour (fs) and normative honour (fs) were the individual-level factor scores. Society was not entered to the models predicting the likelihood of efficient competition as a random intercept due to statistically insignificant variance at the between-society level.

3.5 Honour and behavioural deviations from expectations

In this section, we present the results from additional exploratory analyses examining the difference between individuals' own investments in competition and cooperation and their expectations of others' investments in these behaviours.

3.5.1 Honour and efficient/less-efficient competition

In the contest game, we categorized a given game round as *underinvested competition* if the deviation of an individual's own investment in competition from expected competition of the opponent was negative (meaning that they were willing to lose their money), as *tie* if the deviation was equal to zero MU, as *efficient competition* if the deviation was equal to one MU (because an individual could potentially win the contest game with minimal investment, thereby retaining the most remaining resources), and as *less-efficient competition* of the deviation was higher than one MU (because any positive deviations greater than one might ensure a win but reduced the individual's overall payoff in that round).

We present the results from models exploring the association between societal-level honour or individual-level honour values and the occurrence of efficient competition or less-efficient competition (i.e., the likelihood of a game round being categorized as efficient competition and less-efficient competition). Society was removed from the models testing efficient competition as a random intercept due to statistically insignificant variance at the between-society level. We did not find consistent support for the association between societal-level honour and the occurrence of either efficient or less-efficient competition using observed scores (see Table S31) and factor scores (see Table S32) of honour values. However, at the individual-level, perceiving honour values of self-promotion and retaliation as more prevalent in one's society was consistently positively associated with the occurrence of efficient competition (see Model S31b and S32b), but not with less-efficient competition (see Model S31d and S32d).

Table S31. Generalized linear mixed models with personal and perceived normative honour values (observed scores) predicting the likelihood of a game round being categorized as efficient or less-efficient competition.

	Model S31a: Efficient competition			**Model S31b: Efficient competition**			**Model S31c: Less-efficient competition**			**Model S31d: Less-efficient competition**		
Predictors	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*
(Intercept)	0.110	0.102 – 0.119	<0.001	0.127	0.112 – 0.144	<0.001	0.370	0.346 – 0.395	<0.001	0.446	0.375 – 0.531	<0.001
Societal-level honour	**0.934**	**0.875 – 0.997**	**0.039**	0.934	0.876 – 0.997	0.040	**1.156**	**1.084 – 1.234**	**<0.001**	1.067	0.934 – 1.218	0.341
Normative honour (SPR)				**1.112**	**1.024 – 1.207**	**0.012**				**0.967**	**0.879 – 1.064**	**0.497**
Normative honour (DFR)				**1.005**	**0.917 – 1.101**	**0.918**				**0.947**	**0.852 – 1.053**	**0.314**
Personal honour (SPR)				**0.905**	**0.837 – 0.980**	**0.013**				**0.983**	**0.897 – 1.078**	**0.722**
Personal honour (DFR)				**0.928**	**0.850 – 1.013**	**0.093**				**1.026**	**0.925 – 1.138**	**0.632**
Competition behaviour				1.010	0.956 – 1.066	0.725				4.820	4.483 – 5.181	<0.001
Partner gender [male]				1.024	0.923 – 1.136	0.658				0.686	0.624 – 0.754	<0.001
Partner gender [unknown]				1.086	0.980 – 1.204	0.115				0.878	0.799 – 0.964	0.006
Participant gender [male]				0.935	0.825 – 1.059	0.287				0.989	0.855 – 1.144	0.882
Age				1.023	0.960 – 1.090	0.483				1.033	0.959 – 1.113	0.389
Game order [SL-CG]				0.747	0.660 – 0.846	<0.001				0.605	0.523 – 0.700	<0.001
Random Effects												
σ^2	3.290			3.290			3.290			3.290		
τ_{00}	1.543 $_{\text{Participant\_ID}}$			1.516 $_{\text{Participant\_ID}}$			2.180 $_{\text{Participant\_ID:Society}}$			3.006 $_{\text{Participant\_ID:Society}}$		
	N/A			N/A			0.000 $_{\text{Society}}$			0.038 $_{\text{Society}}$		
ICC	0.319			0.315			0.399			0.481		
N	3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$		
	N/A			N/A			13 $_{\text{Society}}$			13 $_{\text{Society}}$		
Observations	20226			20226			20226			20226		
Marginal R^2 / Conditional R^2	0.001 / 0.320			0.009 / 0.322			0.004 / 0.401			0.285 / 0.628		

Note. SPR = self-promotion and retaliation, DFR = defence of family reputation, SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Individuals' own level of competition was controlled in the model. Societal-level honour was the societal mean of perceived normative honour values across both the SPR and DFR facets of honour, while personal honour and normative honour (centred within society) were the individual-level unweighted means across the scale items. Society was not entered to the models predicting the likelihood of efficient competition as a random intercept due to statistically insignificant variance at the between-society level.

Table S32. Generalized linear mixed models with personal and perceived normative honour values (factor scores) predicting the likelihood of a game round being categorized as efficient or less-efficient competition.

	Model S32a: Efficient competition			**Model S32b: Efficient competition**			**Model S32c: Less-efficient competition**			**Model S32d: Less-efficient competition**		
Predictors	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*
(Intercept)	0.110	0.102 – 0.119	<0.001	0.127	0.112 – 0.145	<0.001	0.373	0.338 – 0.411	<0.001	0.446	0.374 – 0.531	<0.001
Societal-level honour (fs)	**0.872**	**0.738 – 1.031**	**0.109**	0.873	0.739 – 1.031	0.110	**1.152**	**0.890 – 1.490**	**0.283**	0.903	0.636 – 1.281	0.568
Normative honour (SPR) (fs)				**1.289**	**1.111 – 1.496**	**0.001**				**0.939**	**0.791 – 1.115**	**0.475**
Normative honour (DFR) (fs)				**1.002**	**0.886 – 1.134**	**0.972**				**0.932**	**0.808 – 1.075**	**0.333**
Personal honour (SPR) (fs)				**0.897**	**0.769 – 1.047**	**0.168**				**0.918**	**0.767 – 1.099**	**0.353**
Personal honour (DFR) (fs)				**0.960**	**0.864 – 1.067**	**0.447**				**1.035**	**0.914 – 1.172**	**0.588**
Competition behaviour				1.003	0.949 – 1.059	0.928				4.832	4.495 – 5.194	<0.001
Partner gender [male]				1.024	0.923 – 1.136	0.654				0.686	0.624 – 0.754	<0.001
Partner gender [unknown]				1.086	0.980 – 1.204	0.115				0.877	0.799 – 0.964	0.006
Participant gender [male]				0.926	0.817 – 1.048	0.224				0.992	0.857 – 1.148	0.913
Age				1.011	0.949 – 1.077	0.727				1.034	0.960 – 1.114	0.378
Game order [SL-CG]				0.750	0.662 – 0.850	<0.001				0.605	0.523 – 0.700	<0.001
Random Effects												
σ^2	3.290			3.290			3.290			3.290		
τ_{00}	1.547 $_{\text{Participant\_ID}}$			1.517 $_{\text{Participant\_ID}}$			2.144 $_{\text{Participant\_ID:Society}}$			3.003 $_{\text{Participant\_ID:Society}}$		
	N/A			N/A			0.019 $_{\text{Society}}$			0.040 $_{\text{Society}}$		
ICC	0.320			0.316			0.397			0.481		
N	3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$		
	N/A			N/A			13 $_{\text{Society}}$			13 $_{\text{Society}}$		
Observations	20226			20226			20226			20226		
Marginal R^2 / Conditional R^2	0.001 / 0.320			0.010 / 0.322			0.001 / 0.397			0.283 / 0.628		

Note. fs = factor score, SPR = self-promotion and retaliation, DFR = defence of family reputation, SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Individuals' own level of competition was controlled in the model. Societal-level honour (fs) was the societal-level factor scores of perceived normative honour values across both the SPR and DFR facets of honour, while personal honour (fs) and normative honour (fs) were the individual-level factor scores. Society was not entered to the models predicting the likelihood of efficient competition as a random intercept due to statistically insignificant variance at the between-society level.

3.5.2 Honour and conditional/unconditional cooperation

In the step-level public goods game, we categorized a given game round as *underinvested cooperation* if the deviation of an individual's own investment in cooperation from expected cooperation of the game partner was negative (meaning that they were willing to contribute less than their partner), as *conditional cooperation* if the deviation was zero MU (because an individual was willing to match their partner's level of cooperation in that round), and as *unconditional cooperation* if the deviation was positive (because an individual was willing to contribute more than their partner, rather than conditioning their contributions on their partner's level of cooperation).

We present the results from models exploring the association between societal-level honour or individual-level honour values and the occurrence of conditional cooperation or unconditional cooperation (i.e., the likelihood of a game round being categorized as conditional cooperation or unconditional cooperation). No association was found between societal-level honour and the occurrence of either conditional or unconditional cooperation using observed scores (see Table S33) and factor scores (see Table S34) of honour values. However, at the individual-level, perceiving honour values of defence of family reputation as more prevalent in one's society was consistently positively associated with the occurrence of conditional cooperation (see Model S33b and S34b), but negatively associated with unconditional cooperation (see Model S33d and S34d).

Table S33. Generalized linear mixed models with personal and perceived normative honour values (observed scores) predicting the likelihood of a game round being categorized as conditional or unconditional cooperation.

	Model S33a: Conditional cooperation			**Model S33b: Conditional cooperation**			**Model S33c: Unconditional cooperation**			**Model S33d: Unconditional cooperation**		
Predictors	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*
(Intercept)	0.407	0.369 – 0.449	<0.001	0.327	0.285 – 0.375	<0.001	0.498	0.457 – 0.544	<0.001	0.503	0.420 – 0.602	<0.001
Societal-level honour	**0.905**	**0.818 – 1.001**	**0.051**	0.896	0.811 – 0.989	0.029	**1.090**	**0.996 – 1.192**	**0.061**	0.979	0.848 – 1.129	0.769
Normative honour (SPR)				**0.945**	**0.873 – 1.023**	**0.161**				**0.991**	**0.901 – 1.089**	**0.847**
Normative honour (DFR)				**1.096**	**1.003 – 1.197**	**0.043**				**0.816**	**0.734 – 0.907**	**<0.001**
Personal honour (SPR)				**0.965**	**0.894 – 1.042**	**0.367**				**1.108**	**1.011 – 1.214**	**0.028**
Personal honour (DFR)				**1.010**	**0.927 – 1.101**	**0.816**				**0.938**	**0.847 – 1.040**	**0.224**
Cooperation behaviour				1.167	1.115 – 1.221	<0.001				5.098	4.744 – 5.477	<0.001
Partner gender [male]				1.036	0.954 – 1.125	0.397				0.735	0.669 – 0.806	<0.001
Partner gender [unknown]				1.006	0.926 – 1.092	0.892				0.941	0.858 – 1.031	0.192
Participant gender [male]				1.380	1.222 – 1.558	<0.001				0.852	0.737 – 0.985	0.030
Age				1.072	1.008 – 1.140	0.028				0.992	0.921 – 1.068	0.828
Game order [SL-CG]				1.095	0.970 – 1.236	0.143				0.965	0.835 – 1.115	0.625
Random Effects												
σ^2	3.290			3.290			3.290			3.290		
τ_{00}	2.211 $_{\text{Participant\_ID:Society}}$			2.108 $_{\text{Participant\_ID:Society}}$			1.863 $_{\text{Participant\_ID:Society}}$			3.066 $_{\text{Participant\_ID:Society}}$		
	0.019 $_{\text{Society}}$			0.018 $_{\text{Society}}$			0.014 $_{\text{Society}}$			0.046 $_{\text{Society}}$		
ICC	0.404			0.393			0.363			0.486		
N	3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$		
	13 $_{\text{Society}}$			13 $_{\text{Society}}$			13 $_{\text{Society}}$			13 $_{\text{Society}}$		
Observations	20226			20226			20226			20226		
Marginal R^2 / Conditional R^2	0.002 / 0.405			0.014 / 0.401			0.001 / 0.364			0.294 / 0.637		

Note. SPR = self-promotion and retaliation, DFR = defence of family reputation, SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Individuals' own level of cooperation was controlled in the model. Societal-level honour was the societal mean of perceived normative honour values across both the SPR and DFR facets of honour, while personal honour and normative honour (centred within society) were the individual-level unweighted means across the scale items.

Table S34. Generalized linear mixed models with personal and perceived normative honour values (factor scores) predicting the likelihood of a game round being categorized as conditional or unconditional cooperation.

	Model S34a: Conditional cooperation			**Model S34b: Conditional cooperation**			**Model S34c: Unconditional cooperation**			**Model S34d: Unconditional cooperation**		
Predictors	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*	*Odds Ratios*	*95% CI*	*p*
(Intercept)	0.407	0.365 – 0.454	<0.001	0.328	0.283 – 0.380	<0.001	0.499	0.453 – 0.550	<0.001	0.501	0.421 – 0.596	<0.001
Societal-level honour (fs)	**0.935**	**0.699 – 1.252**	**0.654**	0.908	0.677 – 1.217	0.518	**1.052**	**0.813 – 1.362**	**0.700**	0.808	0.572 – 1.142	0.228
Normative honour (SPR) (fs)				**0.922**	**0.800 – 1.064**	**0.267**				**0.982**	**0.828 – 1.165**	**0.837**
Normative honour (DFR) (fs)				**1.156**	**1.026 – 1.303**	**0.017**				**0.785**	**0.681 – 0.905**	**0.001**
Personal honour (SPR) (fs)				**0.997**	**0.858 – 1.158**	**0.969**				**1.099**	**0.920 – 1.313**	**0.299**
Personal honour (DFR) (fs)				**1.041**	**0.938 – 1.155**	**0.450**				**0.906**	**0.801 – 1.024**	**0.114**
Cooperation behaviour				1.164	1.112 – 1.217	<0.001				5.085	4.733 – 5.464	<0.001
Partner gender [male]				1.036	0.954 – 1.125	0.397				0.735	0.669 – 0.806	<0.001
Partner gender [unknown]				1.006	0.926 – 1.092	0.892				0.941	0.858 – 1.031	0.193
Participant gender [male]				1.372	1.216 – 1.549	<0.001				0.856	0.741 – 0.990	0.036
Age				1.065	1.001 – 1.132	0.046				0.993	0.923 – 1.069	0.854
Game order [SL-CG]				1.095	0.970 – 1.236	0.141				0.967	0.837 – 1.117	0.647
Random Effects												
σ^2	3.290			3.290			3.290			3.290		
τ_{00}	2.210 $_{\text{Participant\_ID:Society}}$			2.103 $_{\text{Participant\_ID:Society}}$			1.862 $_{\text{Participant\_ID:Society}}$			3.053 $_{\text{Participant\_ID:Society}}$		
	0.028 $_{\text{Society}}$			0.029 $_{\text{Society}}$			0.021 $_{\text{Society}}$			0.039 $_{\text{Society}}$		
ICC	0.405			0.393			0.364			0.485		
N	3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$			3371 $_{\text{Participant\_ID}}$		
	13 $_{\text{Society}}$			13 $_{\text{Society}}$			13 $_{\text{Society}}$			13 $_{\text{Society}}$		
Observations	20226			20226			20226			20226		
Marginal R^2 / Conditional R^2	0.000 / 0.405			0.014 / 0.401			0.000 / 0.364			0.295 / 0.637		

Note. fs = factor score, SPR = self-promotion and retaliation, DFR = defence of family reputation, SL = step-level public goods game, CG = contest game, *std. Beta* = standardized regression coefficient. The reference level for partner gender was [female], for participant gender was [female], for game order was [CG-SL]. Individuals' own level of cooperation was controlled in the model. Societal-level honour (fs) was the societal-level factor scores of perceived normative honour values across both the SPR and DFR facets of honour, while personal honour (fs) and normative honour (fs) were the individual-level factor scores.

4. Descriptives

Table S35. Sample descriptives for each society.

		N		**Age**		**SSS (1-10)**	**Education (1-8)**	**Ethnicity**	
Societies	**ISO-3**	*n*	% Female	*M (SD)*	Range	*M (SD)*	*M (SD)*	Majority	% Majority
Egypt	EGY	270	50.38%	40.78 (14.00)	[18, 68]	6.84 (2.04)	5.23 (1.34)	Egyptian	99.63%
Greece	GRC	255	49.61%	40.59 (13.76)	[18, 69]	5.40 (1.55)	4.60 (1.25)	Greek	98.43%
Greek Cypriot community	CYP-S*	269	50.93%	41.22 (14.20)	[18, 77]	5.91 (1.54)	4.21 (1.42)	Greek Cypriot	97.76%
Italy	ITA	270	50.37%	41.14 (14.21)	[19, 79]	5.61 (1.51)	4.32 (1.48)	White: Italian	98.52%
Japan	JPN	261	49.23%	41.56 (14.91)	[18, 78]	4.76 (2.04)	4.83 (1.11)	Asian	98.05%
Lebanon	LBN	250	53.01%	39.25 (12.83)	[18, 63]	5.54 (1.67)	4.32 (1.69)	Lebanese	98.76%
Morocco	MAR	260	49.22%	39.81 (13.15)	[18, 68]	5.33 (1.71)	3.30 (1.85)	Moroccan	99.23%
South Korea	KOR	271	49.82%	41.21 (14.61)	[18, 79]	4.94 (1.95)	4.56 (1.37)	Korean	99.63%
Spain	ESP	249	48.19%	40.81 (14.30)	[18, 77]	5.72 (1.52)	4.27 (1.63)	Spanish	96.79%
Turkish Cypriot community	CYP-N*	245	49.80%	40.32 (14.46)	[18, 77]	5.89 (2.09)	3.47 (1.63)	Turkish Cypriot	82.50%
Türkiye	TUR	260	50.77%	40.72 (14.01)	[18, 79]	5.80 (1.91)	3.58 (1.56)	Turkish	90.63%
United Kingdom	GBR	255	49.80%	41.47 (15.79)	[18, 80]	5.07 (1.97)	4.58 (1.45)	White: English / Welsh / Scottish / Northern Irish	88.19%
United States	USA	256	51.01%	41.33 (16.25)	[18, 80]	5.79 (2.37)	4.98 (1.36)	Caucasian American/White	67.19%
	Total	**3,371**	**50.16%**	**40.79 (14.36)**	**[18, 80]**	**5.59 (1.92)**	**4.33 (1.58)**	/	**93.60%**

Table S35 (continued)

		Living Environment			Comprehension check of games		
Societies	**ISO-3**	% Urban	**Language**	**Panel**	% Failed 1	% Failed 2	% Failed 3
Egypt	EGY	92.22%	Arabic	Tln's partner	24.44%	28.89%	19.26%
Greece	GRC	94.12%	Greek	Toluna	23.92%	28.24%	10.20%
Greek Cypriot community	CYP-S*	88.10%	Greek	CYMAR	18.22%	22.68%	8.18%
Italy	ITA	83.33%	Italian	Toluna	25.19%	24.81%	16.67%
Japan	JPN	75.86%	Japanese	Toluna	22.61%	23.37%	14.94%
Lebanon	LBN	78.40%	Arabic	Tln's partner	26.40%	20.80%	8.40%
Morocco	MAR	95.00%	Arabic	Tln's partner	27.69%	20.38%	10.77%
South Korea	KOR	98.15%	Korean	Toluna	25.09%	18.82%	16.97%
Spain	ESP	88.35%	Spanish	Toluna	24.10%	27.71%	16.87%
Turkish Cypriot community	CYP-N*	74.29%	Turkish	Statika	32.24%	29.39%	16.73%
Türkiye	TUR	95.00%	Turkish	Tln's partner	33.08%	27.31%	21.15%
United Kingdom	GBR	78.82%	English	Toluna	29.80%	30.20%	14.51%
United States	USA	71.88%	English	Toluna	28.91%	32.81%	21.09%
	Total	**85.79%**	/	/	**26.22%**	**25.75%**	**15.07%**

Note. ISO-3 = three-letter country codes published by the International Organization for Standardization (ISO) to represent countries, dependent territories, and special areas of geographical interest. *To differentiate between the Turkish Cypriot and Greek Cypriot communities, we applied CYP-N for the Turkish Cypriot community, and CYP-S for the Greek Cypriot community. SSS = subjective social status, Education = the average of the father's and mother's education levels, Living Envir. = living environment, % Female = percentage of female participants, % Majority = percentage of participants who self-identified as belonging to the major ethnic group in the respective society, % Urban = percentage of participants with experience living in urban environments (incl. those who have lived in both urban and rural environments), Tln's partner = Toluna's third party panel provider, % Failed 1 = the percentage of participants who answered exactly one out of four comprehension questions incorrectly after two attempts, % Failed 2 = the percentage of participants who answered exactly two out of four comprehension questions incorrectly after two attempts, % Failed 3 = the percentage of participants who answered exactly three out of four comprehension questions incorrectly after two attempts. We found significant differences across societies in participants' failure to answer the comprehension questions of economic games correctly. The between-society variance was significantly different from zero for the percentage of participants who failed exactly one question, $\chi 2\ (1) = 4.33$, $p = .037$; two questions, $\chi 2\ (1) = 6.34$, $p = .012$; and three questions, $\chi 2\ (1) = 19.10$, $p < .001$.

Table S36. Societal means of competition, cooperation and expectations of these behaviours from others.

	Competition		**Comp. Expectation**		**Cooperation**		**Coop. Expectation**	
Societies	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Egypt	6.95	1.97	6.02	1.78	6.65	1.97	6.22	1.72
Greece	6.49	1.98	5.73	1.81	6.42	1.65	6.04	1.66
Greek Cypriot community	6.57	2.13	5.95	1.85	6.41	1.80	6.29	1.50
Italy	6.23	1.91	5.74	1.72	6.26	1.59	6.07	1.56
Japan	6.41	2.32	5.71	2.09	5.71	2.06	5.64	1.83
Lebanon	6.12	1.84	5.04	1.93	5.97	1.61	5.68	1.83
Morocco	6.77	1.94	5.93	1.80	6.37	1.67	5.96	1.48
South Korea	6.20	1.96	5.55	1.76	6.01	1.79	6.01	1.57
Spain	6.28	2.08	5.47	1.77	6.16	1.78	5.82	1.64
Turkish Cypriot community	5.94	1.89	5.76	1.86	5.96	1.76	5.96	1.76
Türkiye	6.76	2.04	6.18	1.82	6.67	1.89	6.44	1.60
United Kingdom	6.25	1.88	5.57	1.75	6.09	1.69	5.61	1.60
United States	6.22	2.13	5.57	1.94	6.14	2.07	5.78	1.89
Total	**6.40**	**2.03**	**5.71**	**1.86**	**6.22**	**1.82**	**5.97**	**1.68**

Note. Comp. Expectation = expectation of others' competition, Coop. Expectation = expectation of others' cooperation, *M* = societal means, *SD* = standard deviations of societal means.

Table S37. Societal mean percentages of rounds involving coordinative decisions and expectations (contributing or expecting others to contribute 8 or 6 MUs), and percentages of rounds categorized as different types of anticipated coordination success.

	Coordinative decisions and expectations				**Anticipated coordination success**		
Societies	Coop. 8	Expe. 8	Coop. 6	Expe. 6	Efficient	Less efficient	Failed
Egypt	17%	17%	18%	23%	27%	35%	37%
Greece	19%	18%	21%	26%	23%	40%	38%
Greek Cypriot community	23%	23%	19%	25%	29%	39%	33%
Italy	19%	18%	24%	27%	19%	44%	36%
Japan	13%	12%	22%	30%	16%	40%	44%
Lebanon	14%	14%	21%	21%	16%	37%	46%
Morocco	20%	18%	24%	27%	22%	40%	38%
South Korea	16%	17%	23%	26%	18%	40%	42%
Spain	17%	17%	24%	26%	19%	41%	40%
Turkish Cypriot community	12%	14%	18%	19%	18%	37%	45%
Türkiye	18%	18%	18%	24%	30%	35%	35%
United Kingdom	17%	13%	20%	23%	16%	37%	46%
United States	15%	14%	18%	20%	22%	31%	47%
Total	**17%**	**17%**	**21%**	**24%**	**21%**	**38%**	**41%**

Note. Coop. 8 = contributing exactly 8 MUs in the step-level public goods game, Expe. 8 = expecting the game partner to contribute exactly 8 MUs, Coop. 6 = contributing exactly 6 MUs, Expe. 6 = expecting the game partner to contribute exactly 6 MUs, Efficient = anticipated success of efficient coordination (expected sum contributions reached 16 MUs), Less-efficient = anticipated success of less efficient coordination (expected sum contributions reached 12 MUs but not 16 MUs), Failed = anticipated failed coordination (expected sum contributions did not reach 12 MUs).

Table S38. Societal mean percentages of rounds categorized as different types of competition deviating from expectations of other's competition and cooperation deviating from expectations of other's cooperation.

Societies	Competition deviated from expectation				Cooperation deviated from expectation		
	Underinvested competition	Tie	Efficient competition	Less efficient competition	Underinvested cooperation	Conditional cooperation	Unconditional cooperation
Egypt	20%	29%	12%	40%	28%	30%	42%
Greece	19%	33%	16%	32%	24%	37%	39%
Greek Cypriot community	21%	33%	17%	29%	28%	38%	34%
Italy	24%	29%	17%	30%	28%	36%	36%
Japan	19%	33%	18%	30%	26%	43%	31%
Lebanon	17%	25%	19%	39%	30%	29%	41%
Morocco	20%	30%	12%	38%	28%	31%	42%
South Korea	22%	27%	18%	33%	31%	35%	34%
Spain	21%	26%	18%	36%	26%	35%	38%
Turkish Cypriot community	30%	30%	12%	28%	32%	30%	38%
Türkiye	23%	34%	11%	31%	30%	35%	36%
United Kingdom	22%	30%	16%	32%	27%	31%	42%
United States	22%	34%	11%	32%	28%	34%	38%
Total	**21%**	**30%**	**15%**	**33%**	**28%**	**34%**	**38%**

Note. Underinvested competition = individual's own competition was less than expected competition from the other in a given round, Tie = the individual competed exactly the same level as the expected level from the other in a given round, Efficient competition = the individual's own competition was just one MU more than the expected competition from the other in a given round, Less-efficient competition = the individual's own competition was at least two MUs more than the expected competition from the other in a given round, Underinvested cooperation = the individual's own contribution was less than expected contribution from the other in a given round, Conditional cooperation = the individual contributed exactly the same level as the expected level from the other in a given round, Unconditional cooperation = the individual's own contribution was more than the expected contribution from the other in a given round.

Table S39. Societal means and factor scores of perceived normative and personal honour values.

	Perceived normative honour values				**Personal honour values**				**Beliefs in a zero-sum game**				**Relational mobility**			
Societies	*M*	*SD*	FS	ω_t	*M*	*SD*	FS	ω_t	*M*	*SD*	FS	ω_t	*M*	*SD*	FS	ω_t
Egypt	6.03	0.80	0.41	0.87	6.03	0.79	0.55	0.86	4.15	1.21	-0.21	0.92	3.76	0.54	-0.06	0.90
Greece	5.29	0.99	0.19	0.90	4.89	0.96	-0.10	0.88	3.96	1.00	-0.05	0.91	3.90	0.64	0.22	0.77
Greek Cypriot community	5.35	0.97	0.48	0.86	4.74	1.07	-0.05	0.87	3.59	0.87	-0.32	0.86	3.88	0.64	0.23	0.84
Italy	5.04	0.94	-0.09	0.89	4.73	1.01	-0.28	0.90	3.81	0.97	-0.07	0.92	3.78	0.54	-0.02	0.90
Japan	4.50	0.88	-0.34	0.89	4.49	0.98	-0.34	0.91	3.64	0.87	0.13	0.91	3.51	0.47	-0.35	0.89
Lebanon	5.64	0.83	-0.08	0.88	5.57	0.82	-0.08	0.89	4.30	0.95	0.03	0.90	3.62	0.39	-0.24	0.86
Morocco	5.66	1.04	0.55	0.91	5.67	0.91	0.81	0.86	3.82	1.11	-0.29	0.90	3.84	0.55	0.09	0.86
South Korea	4.89	0.92	0.05	0.89	4.77	0.93	0.03	0.89	3.97	0.95	0.32	0.93	3.68	0.52	-0.13	0.91
Spain	4.98	1.12	-0.16	0.91	4.99	1.13	-0.05	0.92	3.97	1.03	0.17	0.91	3.81	0.60	0.10	0.81
Turkish Cypriot community	5.05	0.86	0.17	0.82	4.92	0.95	0.25	0.85	3.81	0.97	0.11	0.85	3.79	0.58	0.05	0.76
Türkiye	5.50	1.00	0.15	0.92	5.51	0.95	0.30	0.90	4.28	1.01	0.18	0.88	3.73	0.49	0.00	0.90
United Kingdom	4.45	1.10	-0.60	0.89	4.43	1.06	-0.55	0.89	/	/	/	/	3.79	0.53	0.02	0.85
United States	4.44	1.40	-0.72	0.92	4.61	1.33	-0.49	0.93	/	/	/	/	3.86	0.63	0.11	0.91
Total	**5.14**	**1.11**	**/**	**0.90**	**5.03**	**1.11**	**/**	**0.90**	**3.93**	**1.02**	**/**	**0.89**	**3.76**	**0.56**	**/**	**0.88**

Note. *M* = societal means, *SD* = standard deviations of societal means, FS = factor scores at the between-society level obtained from the multilevel confirmatory factor analysis, adjusting for response style (see Section 2 for more information). ω_t (Omega Total) represented the overall reliability of the scale, accounting for both general and specific factors, indicating the proportion of variance in the scale scores that can be attributed to consistent sources rather than random error[15]. Values above 0.80 are generally considered to indicate good reliability. Beliefs in a zero-sum game were not reported for the U.K. and the U.S.A. because participants' responses were given on a seven-point scale in these two societies due to a survey programming error, while a six-point scale was used in the other sample.

Table S40. Societal means of each facet of perceived normative and personal honour values.

	Perceived normative honour values				**Personal honour values**			
	SPR		**DFR**		**SPR**		**DFR**	
Society	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Egypt	5.57	1.09	6.33	0.88	5.40	1.21	6.44	0.82
Greece	4.94	1.21	5.53	1.10	4.19	1.24	5.36	1.13
Greek Cypriot community	4.82	1.14	5.70	1.12	3.90	1.30	5.31	1.21
Italy	4.68	1.17	5.28	1.04	4.03	1.31	5.20	1.14
Japan	4.26	0.98	4.67	0.99	4.21	1.03	4.67	1.09
Lebanon	5.45	0.99	5.77	0.91	5.31	1.04	5.75	0.91
Morocco	5.01	1.25	6.10	1.20	4.82	1.31	6.24	0.97
South Korea	4.53	1.12	5.12	1.03	4.28	1.11	5.10	1.04
Spain	4.76	1.15	5.12	1.24	4.60	1.21	5.24	1.27
Turkish Cypriot community	4.67	1.07	5.30	0.99	4.32	1.28	5.31	1.04
Türkiye	5.13	1.11	5.75	1.12	4.92	1.13	5.90	1.05
United Kingdom	3.99	1.24	4.75	1.25	3.88	1.33	4.80	1.19
United States	3.95	1.60	4.76	1.56	4.02	1.64	5.01	1.47
Total	**4.75**	**1.26**	**5.40**	**1.23**	**4.45**	**1.34**	**5.41**	**1.22**

Note. SPR = self-promotion and retaliation, DFR = defence of family reputation, *M* = societal means, *SD* = standard deviations of societal means.

In Figures S4 to S5 below, we reported the associations between predictor variables at the between-society and within-society levels, using observed scores and factor scores (see Section 2 for more information about obtaining factor scores for multi-item measures). At the between-society level, societal-level honour was not associated with societal-level relational mobility; societal-level honour was negatively associated with societal-level beliefs in a zero-sum game when using factor scores, but not when using observed scores (observed scores: r = .186, see Figure S4a; factor scores: r = –.715, see Figure S4b). However, the results from multilevel confirmatory factor analyses showed nonsignificant variance for beliefs in a zero-sum game (see Section 2.2) and relational mobility (see Section 2.3) at the between-society level. This indicated that these two variables may not vary significantly at the societal level among the current samples. Interpretations of these societal-level correlation coefficients in Figures S4a and S4b should also be made cautiously, given the small number of societies.

Based on both observed scores and factor scores of societal-level honour, we report associations between this variable and other societal-level indicators that were retrieved from online databases (see Table S13 for the operationalization of these indicators). We observed substantial negative correlations between societal-level honour and market competitiveness (observed score: r = –.971, see Figure S4a; factor score: r = –.769, see Figure S4b), as well as with GNI (observed score: r = –.909, see Figure S4a; factor score: r = –.790, see Figure S4b), GDP per capita (observed score: r = –.864, see Figure S4a; factor score: r = –.764, see Figure S4b), and corruption perception index (observed score: r = –.947, see Figure S4a; factor score: r = –.668, see Figure S4b). Conversely, a large positive correlation was found between societal-level honour and historical prevalence of infectious disease (observed score: r = .668, see Figure S4a; factor score: r = .637, see Figure S4b).

At the within-society level, self-promotion and retaliation and defence of family reputation were positively correlated when honour was measured as personal values

(observed scores: r = .457, see Figure S5a; factor scores: r = .368, see Figure S5b), and the strength of the positive association became stronger when honour was measured as perceived normative values (observed scores: r = .516; factor scores: r = .671). Relational mobility was consistently positively associated with the defence of family reputation facet of personal values (observed scores: r = .148; factor scores: r = .316), and perceived normative values (observed scores: r = .203; factor scores: r = .347). Beliefs in a zero-sum game was positively associated with only the self-promotion and retaliation dimension of honour values, regardless of whether these values were personally endorsed (observed scores: r = .369; factor scores: r = .163) or perceived as societal norms (observed scores: r = .264; factor scores: r = .101), but negatively associated with relational mobility (observed scores: r = –.183; factor scores: r = –.068).

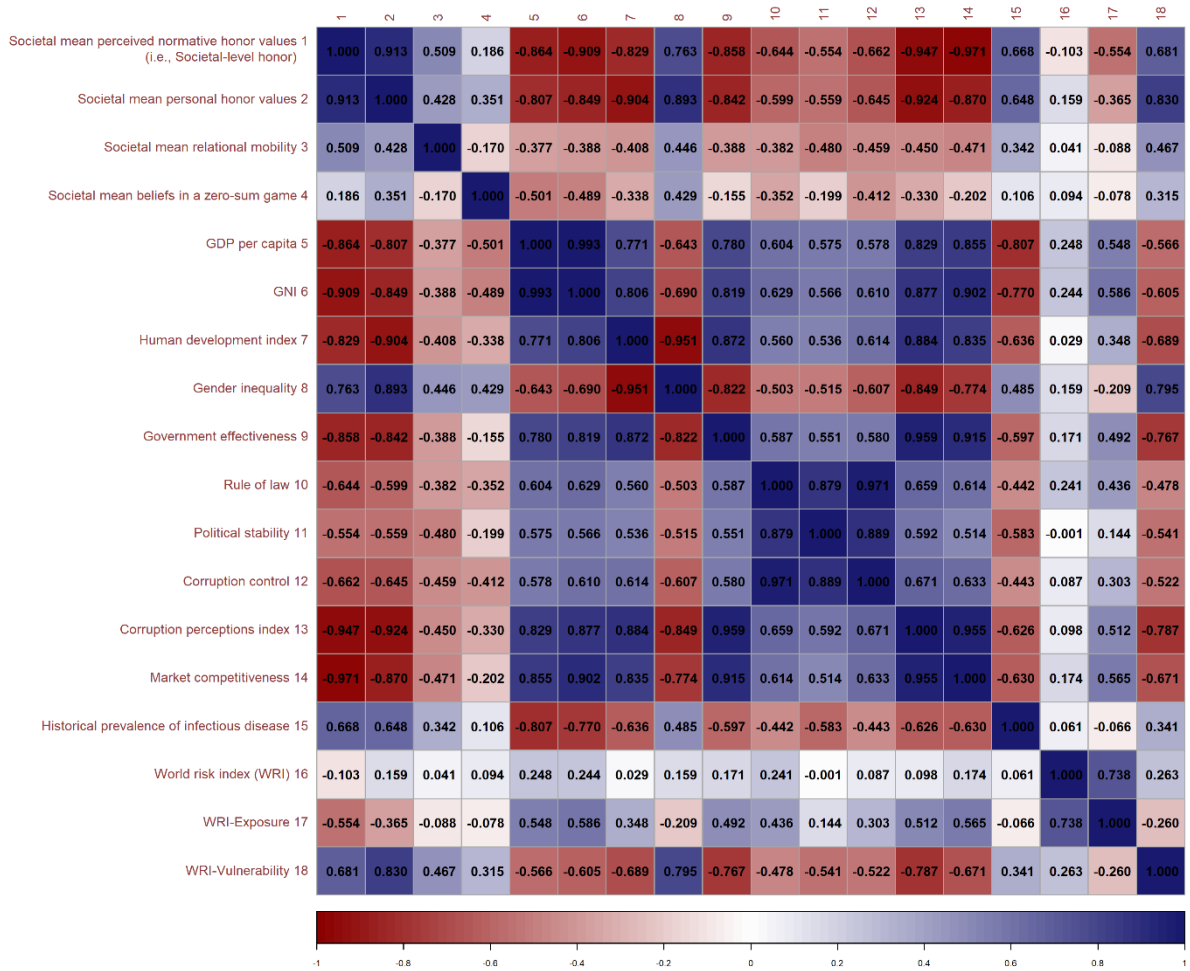

Figure S4a. Intercorrelations between societal-level indicators (using observed scores for variables 1-4, $N_{society}$ = 13).

Note. Correlation coefficients with absolute values greater than or equal to .578 were statistically significant at the 0.05 level. Beliefs in a zero-sum game ($N_{society}$ = 11) were not reported for the U.K. and the U.S.A. because participants' responses were given on a seven-point scale in these two societies due to a survey programming error, while a six-point scale was used in the other societies. Societal-level indicators from (5) GDP per capita to (18) WRI-Vulnerability were not retrievable for the Turkish Cypriot community ($N_{society}$ = 12).

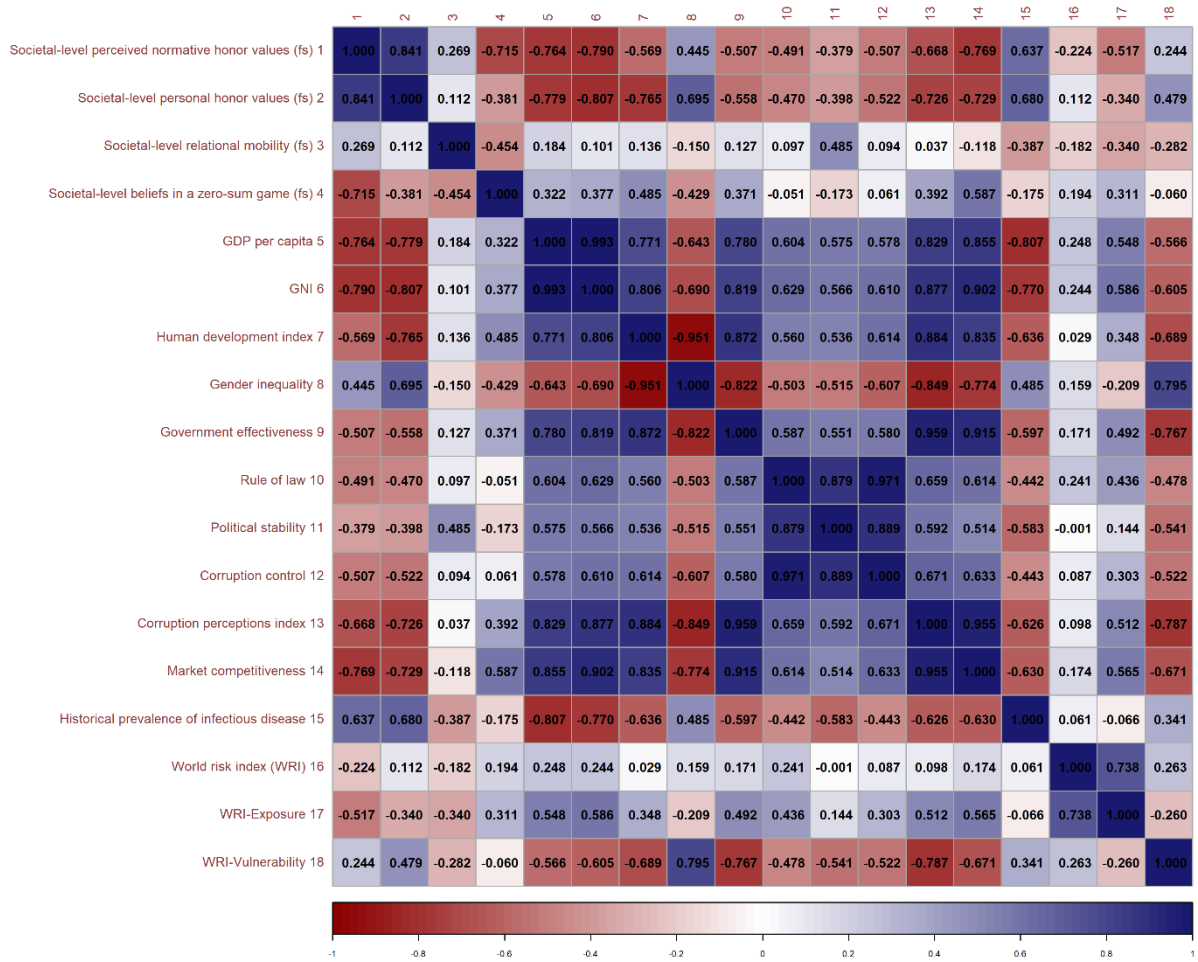

Figure S4b. Intercorrelations between societal-level indicators (using factor scores for variables 1-4, $N_{society}$ = 13).

Note. Correlation coefficients with absolute values greater than or equal to .580 were statistically significant at the 0.05 level. Beliefs in a zero-sum game ($N_{society}$ = 11) were not reported for the U.K. and the U.S.A. because participants' responses were given on a seven-point scale in these two societies due to a survey programming error, while a six-point scale was used in the other societies. Societal-level indicators from (5) GDP per capita to (18) WRI-Vulnerability were not retrievable for the Turkish Cypriot community ($N_{society}$ = 12).

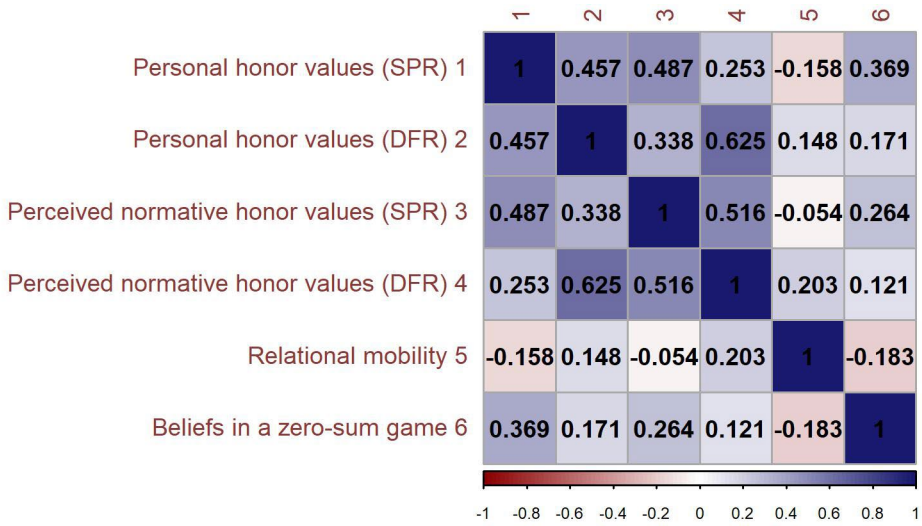

Figure S5a. Correlations between observed scores of predictor variables at the within-society level ($N_{participant}$ = 3,371).
Note. SPR = self-promotion and retaliation, DFR = defence of family reputation. All the correlation coefficients were statistically significant at the 0.05 level. Beliefs in a zero-sum game ($N_{participant}$ = 2,860) were not reported for the U.K. and the U.S.A. because participants' responses were given on a seven-point scale in these two societies due to a survey programming error, while a six-point scale was used in the other societies.

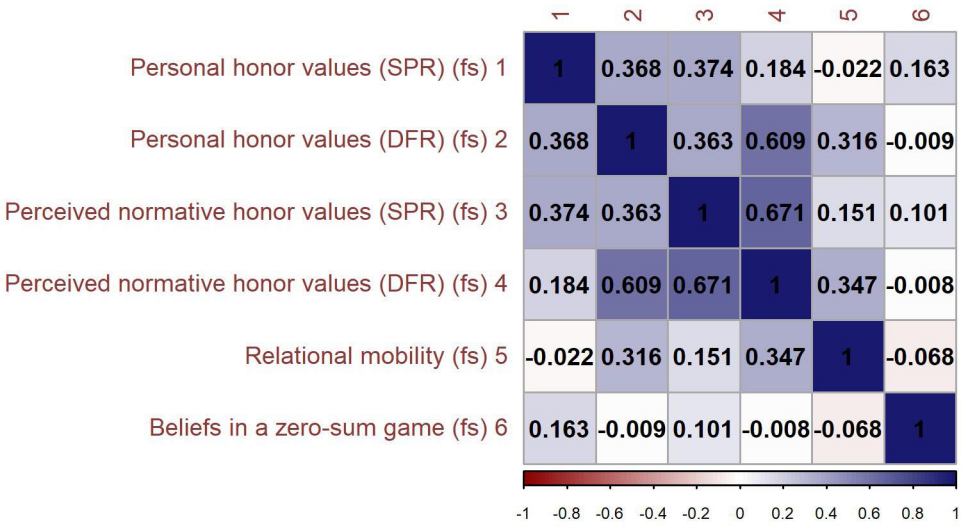

Figure S5b. Correlations between factor scores of predictor variables at the within-society level ($N_{participant}$ = 3,371).
Note. SPR = self-promotion and retaliation, DFR = defence of family reputation. Correlation coefficients with absolute values greater than or equal to .068 were statistically significant at the 0.05 level. Beliefs in a zero-sum game ($N_{participant}$ = 2,860) were not reported for the U.K. and the U.S.A. because participants' responses were given on a seven-point scale in these two societies due to a survey programming error, while a six-point scale was used in the other societies.

5. Games

5.1 Contest game

In the contest game, each player received an endowment of 10 MUs and decided how many of the 10 MUs they wanted to invest into a challenge pool (investment = x_i, $0 \leq x_i \leq 10$) or keep for themselves. Player *i*'s payoff π_i was defined as (see Table S41 for the discrete payoff matrix):

$$\pi_i = \begin{cases} (10 - x_i) + (10 - x_j), & \text{if } x_i > x_j \text{ (i.e., } i \text{ wins)} \\ 10 - x_i, & \text{if } x_i = x_j \text{ (i.e., } i \text{ and } j \text{ tie)} \\ 0, & \text{if } x_i < x_j \text{ (i.e., } i \text{ loses).} \end{cases} \quad (1)$$

Table S41. Discrete payoff matrix for the contest game.

Player *j* \ Player *i*	0	1	2	3	4	5	6	7	8	9	10
0	10, 10	0, 19	0, 18	0, 17	0, 16	0, 15	0, 14	0, 13	0, 12	0, 11	0, 10
1	19, 0	9, 9	0, 17	0, 16	0, 15	0, 14	0, 13	0, 12	0, 11	0, 10	0, 9
2	18, 0	17, 0	8, 8	0, 15	0, 14	0, 13	0, 12	0, 11	0, 10	0, 9	0, 8
3	17, 0	16, 0	15, 0	7, 7	0, 13	0, 12	0, 11	0, 10	0, 9	0, 8	0, 7
4	16, 0	15, 0	14, 0	13, 0	6, 6	0, 11	0, 10	0, 9	0, 8	0, 7	0, 6
5	15, 0	14, 0	13, 0	12, 0	11, 0	5, 5	0, 9	0, 8	0, 7	0, 6	0, 5
6	14, 0	13, 0	12, 0	11, 0	10, 0	9, 0	4, 4	0, 7	0, 6	0, 5	0, 4
7	13, 0	12, 0	11, 0	10, 0	9, 0	8, 0	7, 0	3, 3	0, 5	0, 4	0, 3
8	12, 0	11, 0	10, 0	9, 0	8, 0	7, 0	6, 0	5, 0	2, 2	0, 3	0, 2
9	11, 0	10, 0	9, 0	8, 0	7, 0	6, 0	5, 0	4, 0	3, 0	1, 1	0, 1
10	10, 0	9, 0	8, 0	7, 0	6, 0	5, 0	4, 0	3, 0	2, 0	1, 0	0, 0

In the contest game described above, the player investing more wins, taking the opponent's remaining MUs, while a tie results in each player retaining their non-invested MUs. When neither player invests in competition ($x_i = 0, x_j = 0$), any unilateral deviation from this strategy (i.e., the deviating player investing at least 1 MU) would lead the deviating player to win, making the deviation advantageous. Thus, investing 1 MU while the opponent invests nothing yields the highest payoff for a player. However, both players always have an incentive to increase their investment by one MU more than the other player to ensure the highest possible payoff given the other player's investment. This continuous escalation leads to four stable outcomes where each player invests either 9 or 10 MUs, as any deviations from

the combination of these decisions would result in a guaranteed loss for the deviating player. Thus, this game involves four Nash equilibria where both players invest either 9 or 10 MUs.

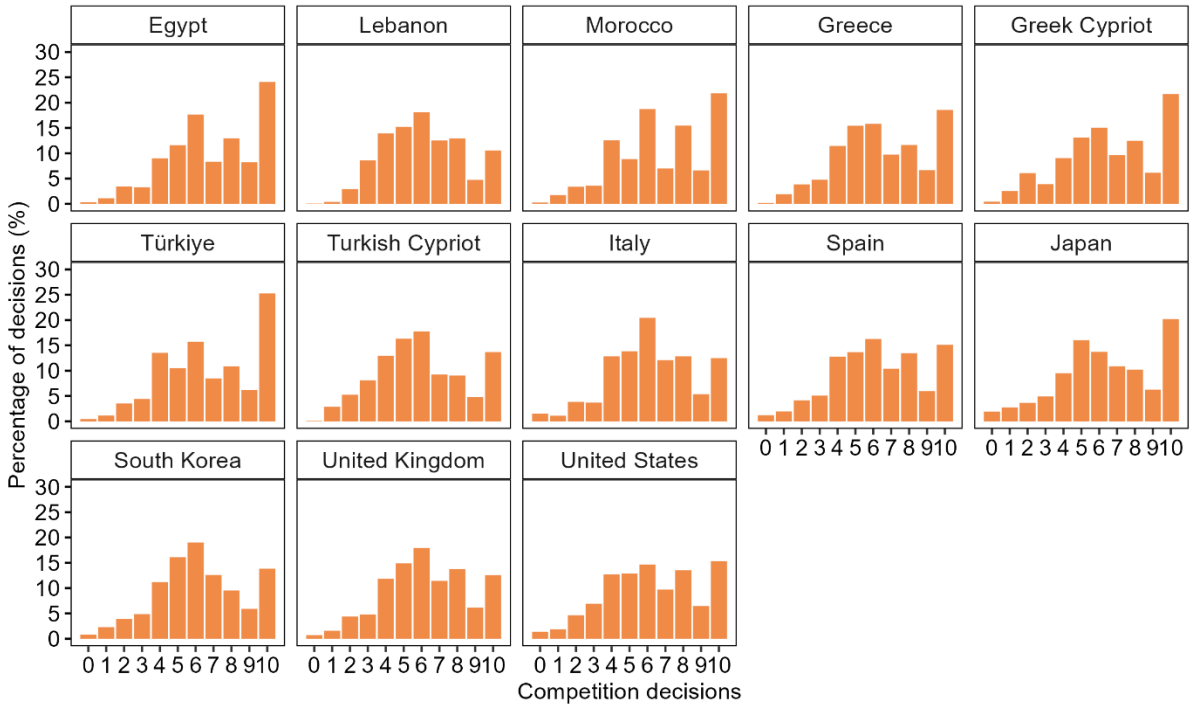

Figure S6a. Percentage of each competition decision (0-10) per society.

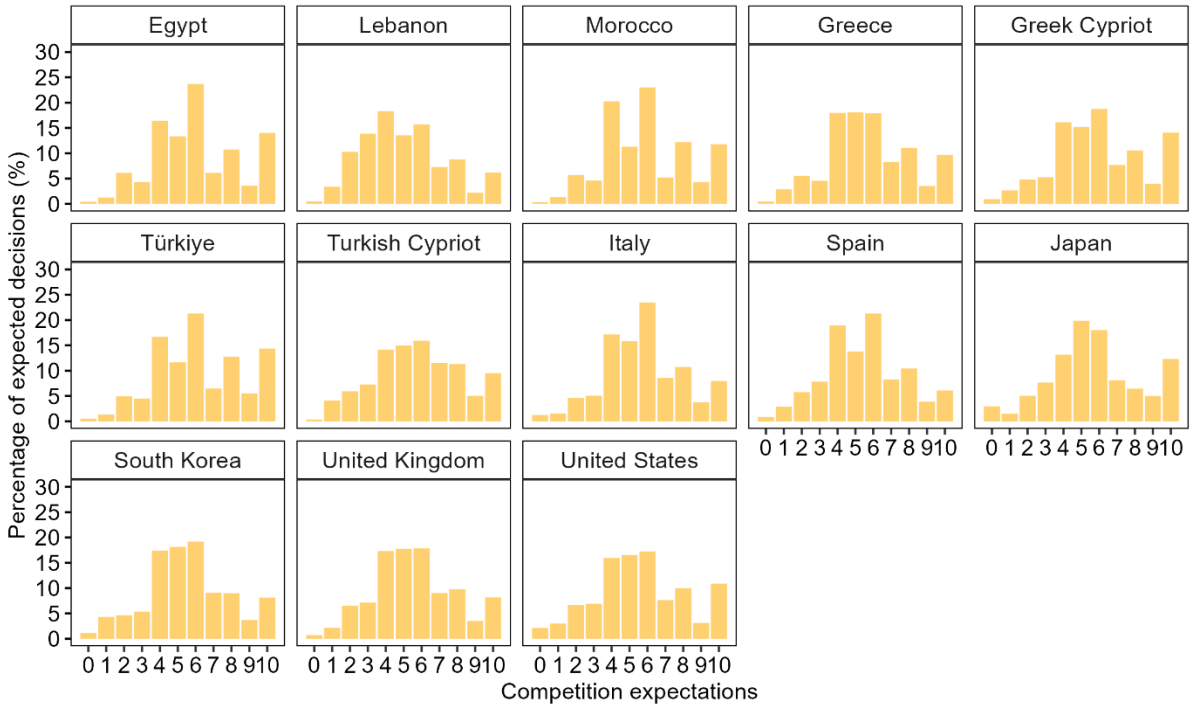

Figure S6b. Percentage of each expected cooperation decision from others (0-10) per society.

5.2 Step-level public goods game

In the step-level public goods game, each player received an endowment of 10 MUs and decided how many of the 10 MUs they wanted to invest into a common pool (investment = x_i, $0 \leq x_i \leq 10$) or keep for themselves. Player i's payoff π_i was defined as (see Table S42 for the discrete payoff matrix):

$$\pi_i = \begin{cases} 10 - x_i, & \text{if} \quad x_i + x_j < 12 \\ 10 - x_i + 10, & \text{if} \quad 12 \leq x_i + x_j < 16 \\ 10 - x_i + 15, & \text{if} \quad 16 \leq x_i + x_j. \end{cases} \tag{2}$$

Table S42. Discrete payoff matrix for the step-level public goods game.

		Player *i*										
		0	1	2	3	4	5	6	7	8	9	10
Player *j*	0	10, 10	10, 9	10, 8	10, 7	10, 6	10, 5	10, 4	10, 3	10, 2	10, 1	10, 0
	1	9, 10	9, 9	9, 8	9, 7	9, 6	9, 5	9, 4	9, 3	9, 2	9, 1	9, 0
	2	8, 10	8, 9	8, 8	8, 7	8, 6	8, 5	8, 4	8, 3	8, 2	8, 1	18, 10
	3	7, 10	7, 9	7, 8	7, 7	7, 6	7, 5	7, 4	7, 3	7, 2	17, 11	17, 10
	4	6, 10	6, 9	6, 8	6, 7	6, 6	6, 5	6, 4	6, 3	16, 12	16, 11	16, 10
	5	5, 10	5, 9	5, 8	5, 7	5, 6	5, 5	5, 4	15, 13	15, 12	15, 11	15, 10
	6	4, 10	4, 9	4, 8	4, 7	4, 6	4, 5	14, 14	14, 13	14, 12	14, 11	19, 15
	7	3, 10	3, 9	3, 8	3, 7	3, 6	13, 15	13, 14	13, 13	13, 12	18, 16	18, 15
	8	2, 10	2, 9	2, 8	2, 7	12, 16	12, 15	12, 14	12, 13	17, 17	17, 16	17, 15
	9	1, 10	1, 9	1, 8	11, 17	11, 16	11, 15	11, 14	16, 18	16, 17	16, 16	16, 15
	10	0, 10	0, 9	10, 18	10, 17	10, 16	10, 15	15, 19	15, 18	15, 17	15, 16	15, 15

In the step-level public goods game described above, there are two provision points (i.e., at 12 and 16 MUs), and two robust pure strategy Nash equilibria. The first equilibrium is where neither player contributes to the common pool ($x_i = 0, x_j = 0$), resulting in each player retaining their initial endowment of 10 MUs. The second equilibrium is when both players contribute 8 MUs ($x_i = 8, x_j = 8$), meeting the second provision point and resulting in a payoff of 17 MUs each. These equilibria existed because, in each scenario, players have no incentive to deviate unilaterally, as such deviations would lead to lower payoffs by failing to meet the required provision point, or by wasting non-needed contributions. There is a special case when both players contribute exactly 6 MUs ($x_i = 6, x_j = 6$). This allows them to reach the first provision point and each receive a payoff of 14 MUs. However, this strategy

does not hold as a Nash equilibrium considering that once the first provision point was reached, players always have an incentive to contribute more to reach the second provision point.

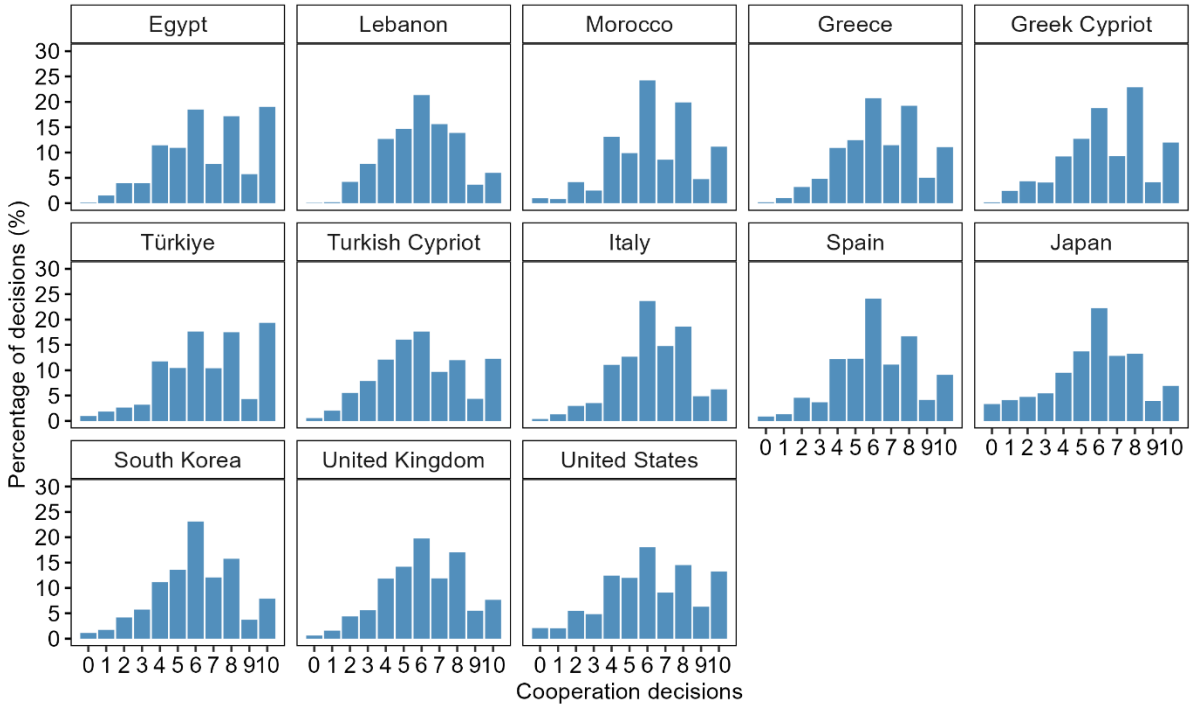

Figure S7a. Percentage of each cooperation decision (0-10) per society.

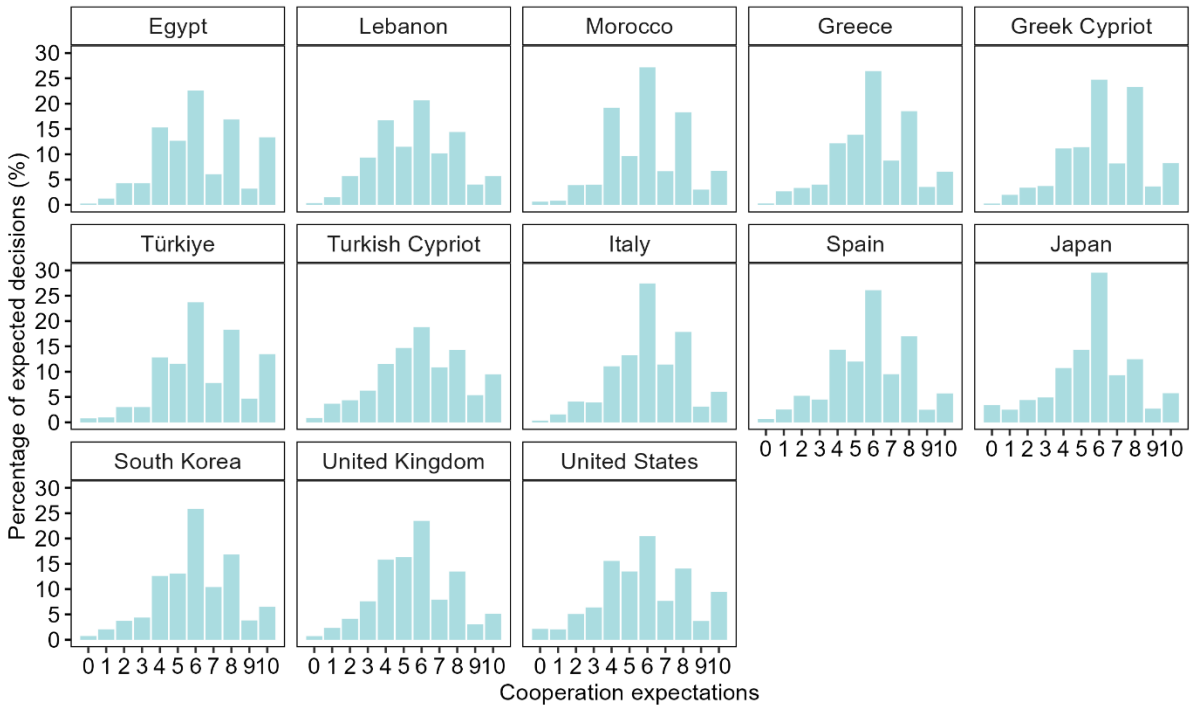

Figure S7b. Percentage of each expected cooperation decision from others (0-10) per society.

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