

Validation of Morality as Cooperation Questionnaire in Turkey, and its Relation to  
Prosociality, Ideology, and Resource Scarcity

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**Abstract**

The theory of morality as cooperation (MAC) argues that there are seven distinct and evolved universal moral foundations. Curry, Chesters, and van Lissa (2018) developed a scale to test this theoretical approach and showed that the Relevance subscale of the MAC questionnaire (MAC-Q) fits data well, unlike the Judgment and full form. However, an independent test of the validity of this questionnaire has not been hitherto conducted, and its relation with ideology is unknown. In the first study, we attempted to validate the Turkish form of MAC-Q and then examined the relationship with prosociality and political ideology. The results showed that the fit indices of MAC-Q Relevance are above the standard criteria, unlike the Judgment and full form ( $n=445$ ), and significant relationships with prosociality and political ideology provided additional evidence for the validity. We used the MAC-Q Relevance in Study 2 ( $n=576$ , Turkey) and Study 3 ( $n=921$ , US), and investigated whether manipulating resource scarcity influences the endorsement of MAC. Although there was no effect of the manipulation, correlational findings provided some support for the predictive validity of MAC-Q. Overall, MAC-Q Relevance performs well in representing the lay notions of morality in both Turkey and the US, unlike full form.

*Keywords:* morality as cooperation questionnaire, morality as cooperation theory, moral foundations, political ideology, validation; resource scarcity

### **Validation of Morality as Cooperation Questionnaire in Turkey, and its Relation to Prosociality, Ideology, and Resource Scarcity**

The cognitive underpinning of moral judgments is one of the most studied topics in the psychology literature over the last 50 years (e.g., Haidt, 2001; Kohlberg, 1969; Shweder, Much, Mahapatra, & Park, 1997). Although numerous psychological models of morality appeared during this time-frame, an integrated theoretical approach—combining evolutionary and cultural perspectives—has mostly been missing. In this context, moral foundations theory (MFT), recently proposed by Graham et al. (2013), led to a paradigmatic change in the field of moral psychology.

Unlike previous accounts (i.e., Kohlberg, 1969), MFT explains morality as based on evolved intuitions, and argues that non-rational mechanisms may affect moral judgments. Accordingly, there are at least five different intuitive and automatic moral sentiments, each with an evolutionary function (i.e., care, fairness, loyalty, authority, sanctity). The care/harm foundation is defined as care and compassion towards members of one's group who are in need of protection. Fairness/cheating is defined as the moral sensitivity necessary to maintain justice within the group and serves the purpose of maintaining order. Loyalty/betrayal is defined as the protection of the interests of one's own group without betraying it. Authority/subversion is defined as the tendency for obedience that is important for groups with hierarchical social structures. Finally, sanctity/degradation describes the moral sensitivity that is thought to have evolved due to disgust sensitivity. This adaptation, which provides protection in natural life by preserving the environment and keeping the group members away from diseases caused by microbes and bacteria, also affects the moral sensitivity of individuals. Graham, Haidt, and Nosek (2009) defined the principles of care and fairness consisting of the individualizing principles, and the other three foundations were defined as binding foundations because they were related to binding with the group. Those who are politically liberal see only individualizing foundations as

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morally relevant, while those who are politically conservative give relatively equal importance to the five dimensions.

While this approach to morality has been the subject of many empirical studies, the operationalization of the instrument, commonly used to measure the five moral dimensions proposed by the theory, has faced numerous criticisms. First, the fit indices of the moral foundations questionnaire (MFQ) are generally below the standard fit criteria. Graham et al. (2011) used confirmatory factor analysis of the English version of the MFQ to find out whether the 5-factor model fits data better than the alternative models. Results showed that the 5-factor structure fits data better than the 3-factor model (Shweder et al., 1997) of autonomy (care and fairness), community (loyalty and authority) and divinity (sanctity), and the 2-factor model of individualizing and binding foundations. Although independent standardization studies in different cultures (e.g., [citation blinded]; Nilsson & Erlandsson 2015; [citation blinded]; Zhang & Li 2015) replicated the 5-factor structure of the theory, the fit indices were again below the standard criteria. This suggests that MFQ suffers from a poor operationalization to represent the lay notion of morality. In addition, the theory itself has also faced numerous criticisms. For example, it has been claimed that the principles of individualizing and binding foundations, as proposed by MFT, are not conceptually novel; and that they involve the repackaging of the political psychology literature of the past 50 years (e.g., Sinn & Hayes, 2016). Sinn and Hayes (2016), for example, claim that the individualizing foundations correspond to (reverse) social dominance orientation and that the binding foundations correspond to right-wing authoritarianism [but see Yilmaz and Saribay (2019) for a counter-argument]. In addition, it has been argued that MFT does not have a full-fledged evolutionary perspective because it is mainly inspired by Schweder et al.'s anthropological and cultural studies (Sinn & Hayes, 2016). In addition, there is little evidence that the moral principles proposed by the theory are hereditary (Smith, Alford, Hibbing, Martin, & Hatemi, 2017; but see Haidt, 2016). All these criticisms lead to the idea that

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the MFT does not represent the moral conceptualizations of laypersons well; and that alternative theoretical approaches that better represent lay notions of morality are needed. The theory of morality as cooperation (MAC; Curry, 2016; Curry, Mullins, & Whitehouse, 2018; Curry, Chesters, & Van Lissa, 2018) as a contemporary theoretical approach may provide such an alternative.

### **Morality as Cooperation Theory**

MAC uses nonzero-sum games and evolutionary biology to argue that there are seven distinct universal moral foundations that have evolved as cultural solutions to problems of cooperation commonly faced by human societies. MAC argues that moral foundations evolved because they enhance cooperation. Accordingly, morality consists of seven different foundations (i.e., “family values,” “group loyalty,” “reciprocity,” “heroism,” “deference,” “fairness,” and “property”). Family values address the problem of allocating scarce resources among relatives, and they are related to features such as caring for offspring and helping relatives. Group loyalty encourages harmonious working for mutual cooperation and is related to features such as forming coalitions, favoring one’s own group and adopting local traditions. Reciprocity evolved by solving the problem of social change, and it is directly related to the moral virtues that determine interpersonal relations such as trust and patience. Heroism and deference are two different strategies that arise in cases of disagreement and correspond to being competitive (i.e., hawkish, aggressive traits) and obedient (i.e., dovish, peaceful traits). The dimension of fairness is directly related to the sharing of resources and features such as equality and fairness in distribution. The final dimension, property, emerged by solving the ownership problem (Herskovits, 1952).

MAC suggests that moral intuitions evolved as ways to solve problems of cooperation. The care and sanctity dimensions proposed by MFT have not been included in the model since these dimensions are not directly related to cooperation. To sum up, each of these seven moral foundations sustains cooperation across all human societies; and they are, therefore, seen as

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morally relevant in all cultures. Curry et al. (2018) claim that the usefulness of these foundations may be subjected to cultural change or the influences of contextual variables such as resource scarcity or pathogen prevalence in society. Nevertheless, universal moral decision-making mechanisms may still be taking shape over these seven distinct foundations.

## The Current Research

To test MAC, Curry et al. (2018) conducted several studies on Western online samples. Using confirmatory factor analyses, they showed that the full form of morality as cooperation-questionnaire (MAC-Q), which was designed to measure the theoretical framework of MAC, provided a poor fit to data similar to MFQ. However, the relevance (but not the judgment) subscale of MAC-Q, has good construct validity, unlike MFQ. MAC-Q Relevance also had good predictive validity. But as far as we know, there is no independent study testing the validity of MAC-Q in a non-Western culture, although the moral foundations the theory proposed are thought to be universal.

Moreover, the relationship of these foundations to political ideology remains unknown. We defined conservatism by adopting the motivated social cognition account of Jost, Glaser, Kruglanski, and Sulloway (2003), who view it in terms of resistance to change and opposition to equality. Sinn and Hayes (2018) argued that these two orientations (i.e., resistance to change and opposition to equality) represent different evolutionary strategies. They provided evidence that resistance to change reflects altruistic and cooperative strategy, whereas opposition to equality reflects exploitative, manipulative, and deceptive strategy. Therefore, MAC predicts a positive correlation between all seven factors of morality and resistance to change as they indicate cooperative tendencies. On the other hand, the theory predicts a negative relationship between its factors and opposition to equality. Finally, the main hypothesis put forward by the MAC theory is that all seven dimensions should be positively related to cooperation. Therefore, the aim of Study 1 is threefold. (1) Validating MAC-Q in a non-Western country (Turkey) and testing the original

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seven-factor structure against different models (i.e. two-factor structure where family, group, heroism, and deference represent binding; and reciprocity, fairness, and property represent interpersonal individualizing foundations, (2) investigating the relationship of MAC-Q to political ideology, and (3) testing whether the moral foundations proposed by MAC are directly related to prosocial intentions (i.e., cooperation). In Study 2 and 3, we tested the manipulability of MAC-Q Relevance by using a contextual prime (resource scarcity), which was previously shown to activate resource scarcity. In Study 2, we manipulated resource scarcity using a visual prime technique and investigated its effect on both prosociality and MAC-Q Relevance in Turkey. In Study 3, in a preregistered experiment, we used a well-established thought prime technique to manipulate resource scarcity and attempted to test the same hypothesis with an American sample. In both studies, we hypothesized that resource scarcity undermines the endorsement of all of the moral foundations proposed by MAC.

### Study 1

#### Method

**Participants.** The materials, data, and analysis code are accessible at [https://osf.io/cew4t/?view\\_only=6ca53944bed448fb871c942cb35a43ac](https://osf.io/cew4t/?view_only=6ca53944bed448fb871c942cb35a43ac). A total of 445 undergraduates participated in the online study in return for extra course credit (369 women, mean age = 22.14,  $SD = 11.8$ ). All participants were native Turkish speakers.

**Measures and Procedures.** The moral foundations questionnaire (MFQ), developed by Graham et al. (2011) and adapted to Turkish by Yilmaz, Harma, Bahçekapili, and Cesur (2016), comprises two sections with a total of 30-items on a 6-point scale. In the first section, participants rate whether something is morally relevant. In the second section, they rate whether they agree or disagree with the moral judgments given. The scores obtained from six items (three items from each section) are averaged to form an overall score for each foundation (care, fairness, loyalty,

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authority, and sanctity). Internal consistency scores of subscales for relevance items were very low ( $\alpha_{\text{care/harm}} = .40$ ;  $\alpha_{\text{fair/justice}} = .31$ ;  $\alpha_{\text{ingroup}} = .54$ ;  $\alpha_{\text{authority}} = .64$ ;  $\alpha_{\text{purity}} = .49$ ).

The MAC-Q scale follows the same logic with MFQ and comprises two sections. It uses three questions for each foundation for a total of 42 questions. In the first section, participants evaluate whether all seven dimensions are morally relevant (e.g., “Whether or not someone acted to protect their family”). In the second section, they state whether they agree with various moral judgments provided (“People should be willing to do anything to help a member of their family”). Curry et al. (2018) suggested that for each foundation (family, group, reciprocity, heroism, deference, fairness, property), a composite score could be calculated by averaging six items. As in the original, the participants answered questions using a slider between 0-100. In this study, internal consistency scores of subscales for relevance items were satisfactory ( $\alpha_{\text{family}} = .81$ ;  $\alpha_{\text{group}} = .78$ ;  $\alpha_{\text{reciprocity}} = .76$ ;  $\alpha_{\text{heroism}} = .82$ ;  $\alpha_{\text{deference}} = .89$ ;  $\alpha_{\text{fairness}} = .69$ ;  $\alpha_{\text{property}} = .74$ ). However, they are generally low for judgments items ( $\alpha_{\text{family}} = .76$ ;  $\alpha_{\text{group}} = .66$ ;  $\alpha_{\text{reciprocity}} = .68$ ;  $\alpha_{\text{heroism}} = .70$ ;  $\alpha_{\text{deference}} = .76$ ;  $\alpha_{\text{fairness}} = .63$ ;  $\alpha_{\text{property}} = .38$ ).

We measure resistance to change and opposition to equality using Saribay et al.’s scale (2017), which defines conservatism as motivated social cognition (Jost et al., 2003). In this scale, resistance to change is represented by eight items ( $\alpha = .887$ , e.g., “The love of Westernization will result in the assimilation of our [Turkish] culture and identity”), whereas opposition to equality is represented by 17 items ( $\alpha = .859$ , e.g., “If people were treated more equally, we would have fewer problems in this country”—reverse coded) on a 7-point scale from 1 (strongly disagree) to 7 (strongly agree). The scale was previously used in several studies and had good reliability (e.g., Yilmaz & Saribay, 2016, 2018).

To test the predictive power of MAC-Q, a single item quasi-objective prosociality measure was used. We used the prosocial intentions scale, which was developed by Jordan, Mullen, and Murnighan (2011) and adapted to Turkish by Yilmaz and Bahçekapili (2016).



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Participants were asked to rate the probability of engaging in six different activities on a scale from -3 (very improbable) to +3 (very probable) in the next month. Three of the six activities are related to volunteering for an activity related to charity, blood donation, and animal rights, while others are neutral activities (going to a party, going on vacation, going to the cinema). The total prosociality score was calculated by averaging three prosociality items ( $\alpha = .878$ ). In addition to these questions, participants responded to a demographic form, including a single-item political orientation question ranging from 1 (left) to 7 (right). The materials were presented in a fully randomized order.

**Data Analytical Strategy.** All CFA models and Exploratory Structural Equation Modelling (ESEM) were conducted in *Mplus* Version 7. We first tested the original seven-factor structure of MAC using CFA and ESEM approaches for each version of the scale. Then, we run CFA and ESEM on the two-factor structure based on previous conceptualization on moral dimensions where family, group, heroism, and deference represent intergroup foundations (i.e., binding), and reciprocity, fairness, and property represent interpersonal foundations (i.e., individualizing). To explore the factor structure of the MAC-Q, we also tested second-order single-factor structures in which seven dimensions were loaded on a higher-order latent factor (i.e., cooperation), and we estimated a second-order two-factor structure in which seven dimensions were loaded on higher-order two latent factors (i.e., individualizing vs. binding). We only tested originally proposed factor structures for MFQ.

In CFA model specifications, items loaded on their predefined factor and cross-loadings were fixed to be zero. In ESEM specifications, items loaded on their predefined factor and cross-loadings were allowed and approximated to zero as possible using oblique target rotation (Brown, 2001). By using *MPlus* 7, we used the full information maximum likelihood (FIML) method to handle missing data in all studies. To test models, raw data was used as input. Normal theory weighted least squares with  $\chi^2$  and  $\chi^2/df$  ratio were used to evaluate the model fit. Additionally,

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following Hu and Bentler's (1999) two index presentation strategy, we reported the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root-mean-square-error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Accordingly, RMSEA values smaller than .06 and .08 represent an excellent and acceptable model fit, while TLI values larger than .95 and .90 indicate an excellent and acceptable model fit, respectively. Furthermore, since more parameters are estimated in ESEM models as compared to CFA, we evaluate TLI and RMSEA for model comparison between CFA and ESEM models as those indices are corrected for parsimony (Marsh, 2007). Akaike information criterion (AIC) was also used to compare non-nested models.

## Results

Descriptive statistics, including means and standard deviations for the relevance items of the MAC-Q, were presented in Table 1.

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Table 1  
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**Construct Validity.** As presented in Table 2, we ran several confirmatory factor analyses (CFA) for relevance, judgment and total items with different factor solutions. CFA results yielded a good fit to the data for the seven-factor model of relevance items ( $\chi^2(168) = 378.433$ ,  $CFI = .949$ ,  $RMSEA = .053$ , (90% CI [.046–.060]),  $SRMR = .046$ ). The second-order single factor analysis of relevance items also showed an acceptable fit to the data ( $\chi^2(182) = 567.530$ ,  $CFI = .906$ ,  $RMSEA = .069$ , (90% CI [.063–.076]),  $SRMR = .067$ ). Moreover, the single factor model yielded a poor fit to the data ( $\chi^2(189) = 1500.428$ ,  $CFI = .682$ ,  $RMSEA = .125$ , (90% CI [.119–.131]),  $SRMR = .094$ ). Compared to the single factor solution ( $AIC = 82468.897$ ), the seven-factor structure fits the data better ( $AIC = 81388.902$ ;  $AIC_{diff.} = 1079.995$ ). Second-order single-factor solution ( $AIC = 81549.999$ ) provided a better model fit in terms of parsimony as compared to the first-order single-factor solution ( $AIC = 82468.897$ ;  $AIC_{diff.} = 918.898$ ), suggesting that the seven factors could represent a higher order structure (e.g., cooperation).

Overall, the CFA model for the seven-factor solution on relevance items yielded the best fit. Furthermore, the second-order two-factor model for the relevance items also yielded a good fit to the data. However, seven-factor judgment items and full scale of MAC-Q poor fit to the data. Moreover, different combinations of judgment subscale and full items of MAC-Q (i.e., single factor, two-factor, and second-order single factor models) provided poor fit, and ESEM models failed to improve the model fit compared to the CFA models based on TLI and RMSEA comparisons (see Table 2). There were no correlated errors in these model estimations. Structural correlations among latent variables were also significant (see Table 3).

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Table 2  
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We also ran CFAs for MFQ items for five-factor and two-factor solutions. The five-factor model was estimated with one latent factor for each moral foundation, the respective scale items were estimated as manifest variables, and relations between all latent factors were estimated as well. As shown in Table 2, separate CFAs of the relevance and the judgment items showed a

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better overall fit of the data compared with the full scale. For the relevance items, the 5-factor model ( $AIC_{\text{relevance}} = 20666.357$ ) was better than the 2-factor model ( $AIC_{\text{relevance}} = 20814.492$ ). Similarly, for the judgment items, the 5-factor model ( $AIC_{\text{judgment}} = 22943.676$ ) was also better than the 2-factor solution ( $AIC_{\text{judgment}} = 23032.714$ ). Finally, the 5-factor model fitted the data better ( $AIC_{\text{full}} = 43687.991$ ) than the 2-factor solution ( $AIC_{\text{full}} = 43905.278$ ). Among three different versions, relevance items provided the model with the best fit. Even though fit estimates of our models are poor in absolute terms as provided above, these results are in line with previous work (Graham et al., 2011; Yalçındağ et al., 2019; Yilmaz et al., 2016). Structural correlations were mostly significant (see Table 3).

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Table 3  
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To investigate the predictive power of the MAC-Q, we estimated the correlations of conservatism (i.e., resistance to change and opposition to equality) and prosociality scores. Considering the high correlations between MAC-Q subscales, we also regressed these subscales on resistance to change, opposition to equality, and prosociality separately. Results showed significant associations between MAC-Q dimensions, conservatism, and prosociality (Table 4). Specifically, opposition to equality was negatively correlated with reciprocity, fairness, and property dimensions but positively associated with deference. Resistance to change was positively associated with family, group, heroism, and deference. Finally, we found significant and positive correlations between prosociality and family, group, reciprocity, and property.

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Table 4  
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We estimated separate multiple regression analyses to investigate the unique contribution of each MAC-Q dimensions on resistance to change, opposition to equality and prosociality.

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Results revealed that increased deference and decreased fairness were associated with opposition to equality ( $\beta = .295, p < .001$ ;  $\beta = -.196, p < .001$ , respectively;  $R^2 = .110, p < .001$ ). Moreover, family ( $\beta = .219, p < .001$ ) and deference ( $\beta = .444, p < .001$ ) positively predicted resistance to change ( $R^2 = .248, p < .001$ ), whereas fairness negatively predicted resistance to change ( $\beta = -.167, p < .001$ ;  $R^2 = .235, p < .001$ ). Finally, we found significant predictive role of MAC-Q subscales on prosociality ( $R^2 = .051, p < .01$ ). Results also revealed that only group subscale negatively predicts prosociality when other dimensions were entered into the equation simultaneously ( $\beta = -.172, p < .05$ ).

All in all, in the first study, we tested the construct validity of the MAC-Q and its predictive power on conservatism and prosociality, and the results of the construct validity tests revealed that MAC-Q Relevance performs well in representing the lay notions of morality, unlike MAC-Q Judgment, MAC-Q full form, and MFQ. The results also supported the specific predictions of the MAC regarding prosociality and ideology. These findings are in line with Curry et al. (2019). It should be noted that though we found significant correlations between MAC-Q and social attitudes as prosociality and ideology, strength of the relationships were low to moderate. Therefore, more data should accumulate to further our understanding on the validity of the predictions of MAC.

In the next study, we tested the manipulability of MAC-Q and investigated the causal effect of resource scarcity—as a contextual variable—on both prosociality and MAC-Q. In Study 2, we used a Turkish sample, and in Study 3, we used an American sample where we preregistered our hypotheses and analysis plan before any data collection. In both studies, we used the relevance items as an operationalization of MAC-Q following the results of Study 1.

## Study 2

### Method

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**Participants.** A convenience sample from the community was used in this study. The data was collected by several research assistants, and they were instructed to collect data from their friends, family members, and acquaintances. The goal was for each research assistant to collect data until they reach 24 participants. As a result, 576 participants ( $M_{\text{age}} = 28.59$  years,  $SD_{\text{age}} = 10.21$ ) participated in this study in exchange for a gift draw. All participants were native Turkish speakers. Of the participants, 317 (55%) were female. Participants were randomly assigned to either the resource scarcity ( $N = 289$ ) or the control group ( $N = 287$ ).

**Materials and Procedure.** To manipulate resource scarcity, we used a visual prime technique. In the resource scarcity condition, participants were asked to select the most striking photos within six different scarcity visualizations (e.g., people waiting in line for water/bread). In the control condition, participants received six photos of random objects (e.g., pen, tramway).

Before the main study, we tested the effectiveness of scarcity manipulation on an independent sample that consisted of 140 ( $M_{\text{age}} = 22.26$  years,  $SD_{\text{age}} = 1.84$ ) participants. Of the participants, 80 (57%) were female. Half of the participants were randomly assigned to either the resource scarcity or the control condition. After manipulation, participants completed 14-items financial concern questionnaire (Lee & Zietsch, 2011; e.g., I worry about the rising cost of the food). Cronbach's alpha of the scale was satisfactory ( $\alpha = .75$ ). Results of the independent samples t-test revealed that compared to the control condition ( $M = 2.63$ ,  $SD = .42$ ; 95% CI [2.52, 2.74]), participants in the resource scarcity condition ( $M = 2.31$ ,  $SD = .37$ ; 95% CI [2.22, 2.39]) reported lower scores on the financial concern questionnaire, implying that participants in the resource scarcity condition perceived more scarcity,  $t(138) = -4.75$ ,  $p = .001$ ,  $d = .81$ , after the experimental manipulation.

In the main study, following the scarcity manipulation (vs. the control condition), we asked our participants to answer a prosociality question adapted from Bayramoglu, Harma, and Yilmaz (2018). Specifically, they rated the amount of money they keep for themselves if they

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won some money by lottery using a scale ranging from 0 to 100. We then subtracted ratings from 100 to create a prosociality index in which higher scores indicate higher levels of prosociality.

Then, participants completed the relevance subscale of the MAC-Q. Internal consistency scores of subscales for relevance items were satisfactory ( $\alpha_{\text{family}} = .68$ ;  $\alpha_{\text{group}} = .58$ ;  $\alpha_{\text{reciprocity}} = .66$ ;  $\alpha_{\text{heroism}} = .62$ ;  $\alpha_{\text{deference}} = .64$ ;  $\alpha_{\text{fairness}} = .67$ ;  $\alpha_{\text{property}} = .61$ ). Finally, participants completed a demographic form, including a single item political orientation question ranging from 1 (extreme leftist) to 7 (extreme rightist). Higher scores refer to right-wing orientation.

## Results

We first tested if prosociality scores change across the control and the scarcity conditions. Results of the independent samples t-test showed that there were no significant differences between the scarcity group ( $M = 43.57$ ,  $SD = 29.31$ ; 95% CI [40.17, 47.18]) and the control group ( $M = 41.08$ ,  $SD = 29.22$ ; 95% CI [37.58, 44.64]) on prosociality scores,  $t(570) = -1.02$ ,  $p = .311$ ,  $d = .09$ .

To explore group differences (resource scarcity vs. control) on moral foundations, we repeated analyses on each moral foundation (measured by MAC-Q) using a one-way multivariate analysis of variance (MANOVA). Effect of manipulation was non-significant on moral foundations ( $Wilks' \lambda = .99$ ,  $F(7, 565) = 1.10$ ,  $p = .362$ ,  $\eta p^2 = .013$ ). Moreover, follow-up ANOVAs also yielded non-significant results.<sup>1</sup>

We also exploratorily conducted a moderated regression analysis to test the potential moderating role of right-wing political orientation on the relationship between resource scarcity and cooperation. Before the analysis, right-wing political orientation was centered. The results revealed a significant predictive role of right-wing political orientation on cooperation ( $F(2, 563)$

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<sup>1</sup> To fully comply with the preregistered analyses, we compared the total cooperation scores (total score in MAC-Q) on the scarcity and the control groups. There was no significant mean difference on total cooperation scores between scarcity group ( $M = 3.41$ ,  $SD = .81$ ; 95% CI [3.32, 3.51]) and control group ( $M = 3.38$ ,  $SD = .85$ ; 95% CI [3.28, 3.47]),  $t(573) = -.537$ ,  $p = .592$ ,  $d = .04$ .

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= 3.08,  $p = .047$ ,  $R^2 = .01$ ). Accordingly, higher scores on right-wing political orientation predicted higher levels of total cooperation ( $\beta = .10$ ,  $p = .016$ ). However, the main effect of manipulation ( $\beta = .02$ ,  $p = .568$ ) and the interaction term ( $\beta = -.05$ ,  $p = .351$ ) were not significant. Overall, results revealed that resource scarcity manipulation had no effect on cooperation and prosociality scores.

To further test the relationship between prosociality and moral foundations, we conducted a correlation analysis in the whole sample by merging resource scarcity and control conditions. Results supported the original hypothesis that the higher scores on prosociality correlated with most of the moral foundations. We also conducted the same analysis for the experimental and control conditions separately (Table 5).

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Table 5

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Overall, although the pilot study suggested that the manipulation seems to be working effectively, it did not decrease the prosociality in the main experiment in contrast to past literature (e.g., Roux, Goldsmith, & Bonezzi, 2015); and it also did not influence the endorsement of different moral foundations. However, the correlational analyses provided further support for the validity of the MAC-Q. In the next study, we attempted to test the same hypothesis using another (well-established) technique to manipulate resource scarcity in an American sample.

### Study 3

#### Method

**Participants.** Materials, data, and the preregistered hypotheses can be accessed at this link: [https://osf.io/bgksj/?view\\_only=df2e4e4b4c40479eb3a11d5e6f4b9450](https://osf.io/bgksj/?view_only=df2e4e4b4c40479eb3a11d5e6f4b9450). The sample size was determined via an a priori power analysis using G\*Power (Faul, Erdfelner, Buchner, & Lang, 2009) based on small effect size ( $d = .20$ ) since there was no prior study similar to the current one. The required sample size was at least 788 to detect a difference between two conditions in



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an independent samples t-test by setting alpha at .05 (two-tailed) and power at .80. Participants were recruited for a study on “Give us your opinion about social attitudes” via Amazon’s Mechanical Turk (MTurk) crowdsourcing platform. They participated in exchange for money. Of the 975 MTurk workers who initially began the study, 54 did not complete all parts of the study, or they completed the study task in an unrealistically short or long time. Data from these participants were excluded from the statistical analyses, leaving us with a final sample of 921 participants (520 women, 399 men, two preferred not to say;  $M_{\text{age}} = 34.64$  years,  $SD_{\text{age}} = 11.79$ ); and they were randomly assigned to either the resource scarcity manipulation ( $N = 499$ ) or the control group ( $N = 422$ ).<sup>2</sup>

**Materials and Procedure.** To manipulate resource scarcity, we used the same procedure used by Roux et al. (2015). Participants in the resource scarcity condition were asked to list three things for each item they cannot do without gasoline, sugar, wheat, water, or electricity. In the control condition, the participants listed three things for each item they can do with gasoline, sugar, wheat, water, or electricity. Following the manipulation phase, we asked a single prosociality question used by Roux et al. (2015) as follows:

Imagine that you have started a new job. Your new company has a donation program where they encourage employees to donate charity. When you arrive, they ask you whether you would be interested in making donation. You can choose any charitable cause to donate to and you can donate as much or as little money as you would like. There will be no work-related consequences based on whether or not you choose to donate and/or how much you give. Donations are entirely anonymous; no one in the company will be able to know whether you made a donation or not. How likely would you be to make a donation?”

Then, they completed the relevance part of the MAC-Q used in the first study. Cronbach’s alpha reliability coefficients were satisfactory for each dimension (Family = .88; Group = .91;

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<sup>2</sup> Participants who have not completed all parts of the study and those who took an unrealistically short or long time to complete were excluded from the data as previously indicated in the preregistration form ( $N = 54$ ). The results remained constant when all samples were included in the analyses.

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Reciprocity = .90; Heroism = .89; Deference = .85; Fairness = .87; Property = .92; Total = .94).

All participants also completed a demographic form, including single item economic and social conservatism questions (i.e., in general, how liberal (left-wing) or conservative (right-wing) are you on economic/social issues?) Higher scores refer to higher economic and social conservatism.

## Results

**Confirmatory Analyses.** We tested if prosociality scores change across the control and the scarcity conditions using independent samples t-test; however, we failed to replicate Roux et al.'s (2015) original finding. There were no significant differences between the scarcity ( $M = 4.74$ ,  $SD = 1.83$ ; 95% CI [4.58, 4.91]) and the control conditions ( $M = 4.79$ ,  $SD = 1.77$ ; 95% CI [4.63, 4.94]),  $t(917) = .457$ ,  $p = .648$ ,  $d = .03$ ) on prosociality.<sup>3</sup>

**Exploratory Analyses.** We repeated confirmatory analyses for each of the seven moral foundations of MAC-Q to explore potential group differences. A one-way multivariate analysis of variance (MANOVA) was conducted to test the effects of manipulation (control vs. resource scarcity) on moral foundations scores. We found no effect of manipulation (Wilks'  $\lambda = .99$ ,  $F(7, 911) = 1.20$ ,  $p = .302$ ,  $\eta^2 = .009$ ). Follow-up ANOVAs also revealed non-significant results for each of the moral foundations.

To test the potential moderating role of social ideology on the link between resource scarcity manipulation and total cooperation score, we ran a moderated regression analysis where manipulation was the independent variable, and social ideology was the moderator variable. The results yielded a significant predictive role of the ideology ( $F(2, 915) = 60.89$ ,  $p = .001$ ,  $R^2 = .12$ ). Specifically, higher scores on social ideology (indicating social conservatism) predicted higher levels of cooperation score ( $\beta = .34$ ,  $p = .001$ ), in line with both studies, However, the main effect

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<sup>3</sup> For the second set of confirmatory analyses, we investigated whether there is any difference between the scarcity and the control conditions on total cooperation score (obtained by MAC-Q). The results revealed, in contrast to our initial hypothesis, that there were no significant differences between the scarcity group ( $M = 63.28$ ,  $SD = 15.39$ ; 95% CI [61.79, 64.71]) and the control group ( $M = 62.83$ ,  $SD = 16.51$ ; 95% CI [61.67, 64.50]) on cooperation score,  $t(917) = -.425$ ,  $p = .671$ ,  $d = .03$ .

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of manipulation ( $\beta = .03, p = .403$ ) and interaction term ( $\beta = -.07, p = .099$ ) in predicting cooperation score were not significant. Overall, results showed that the resource scarcity manipulation had no significant effect on any of the moral foundations.

Since the scarcity manipulation did not influence prosociality in contrast to Roux et al.'s (2015) original finding, we merged different conditions and ran a correlation analysis to examine if moral foundations of morality as cooperation were associated with prosociality. As depicted in Table 6, the results revealed that prosociality was positively correlated with all moral foundations in the whole sample. The results remained constant except for the property foundation when we only included the control group in the analyses. Results of correlational analyses, therefore, supported the original proposition of MAC that all moral foundations are related to cooperation.

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Table 6  
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### General Discussion

This research provides the first empirical support for measuring the theoretical framework of MAC spanning the non-WEIRD (Turkey) and the WEIRD (the US) countries (Henrich, Heine, & Norenzayan, 2010). CFAs for MAC-Q (full form) indicated a poor fit. However, the results regarding MAC-Q Relevance (but not Judgment) with the seven-factor solution best fits the data in Turkey as in the original study (Curry et al., 2019). In other words, compared to the single-factor solution, full MAC-Q, the judgment subscale of MAC-Q, and the MFQ structure, CFA for the MAC-Q Relevance provides better measurements in our sample. It thus seems that MAC-Q Relevance can be used in Turkey to measure the seven dimensions proposed by this theory. Although we tried to manipulate resource scarcity in either a novel (Study 2) or a well-established technique (Study 3), we failed to find any effect on neither prosociality unlike the previous literature (e.g., Roux et al., 2015) nor moral judgment represented by MAC-Q Relevance. Since the manipulation did not influence prosociality, we merged experimental and

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control conditions; and the results supported the predictions of MAC in two large samples as well as in the control conditions only. These findings are in line with Curry et al. (2019) and suggest that the relevance subscale of MAC-Q is useful in predicting political ideology and prosociality in two cultures spanning WEIRD and non-WEIRD countries.

The predictions of the theory regarding the quasi-objective measure of cooperation (measured as prosocial intentions) were supported by significant positive correlations between prosociality and four of these seven dimensions in Study 1. Also, there was a positive correlation for the other three, although this was not statistically significant in Study 1. This may be due to the limitations of the measurement method used in this study since we elicited prosocial intentions and did not directly observe behavior. However, the subsequent studies clearly showed that higher endorsement of MAC is positively associated with prosociality in both Turkey and the US. Further studies should examine the relationship of these seven dimensions with prosocial behavior using economic games such as the prisoner's dilemma or public goods.

There was no previous study investigating the relationship between MAC-Q and political ideology. In our first study, we defined conservatism in terms of resistance to change and opposition to equality according to the motivated social cognition account of Jost et al. (2003). The results demonstrated that participants with higher resistance to change scores received higher scores in the family, group, heroism, and deference dimensions. This is consistent with the MFT literature (Graham et al., 2013) since these four dimensions are quite similar to the binding foundations (i.e., intergroup foundations), which are also positively related to conservatism (Graham et al., 2009). Likewise, all four dimensions show a positive relationship with the three binding foundations in this study. Participants with higher opposition to equality scores received higher scores in deference and lower scores in reciprocity, justice, and property. Again, these findings are mainly in line with conclusions that were derived from the MFT literature (Graham et al., 2013) since being opposed to equality is already defined as supporting hierarchical

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relations and having less sensitivity to justice (Jost et al., 2003). These findings are also partially in line with the evolutionary approach of Sinn and Hayes (2018) because they argue that resistance to change reflects a cooperative profile and that opposition to equality reflects a deceptive and exploitative profile. Interestingly, however, there was a negative correlation between opposition to equality and the property dimension of MAC, which is surprising since there is a positive relationship between economic conservatism (e.g., support for neoliberal policies) and opposition to equality (Saribay & Yilmaz, 2018). Since valuing private property is one of the founding features of neoliberalism, a significant positive relationship could be expected between these two, yet we found the opposite. This indicates that the question on private property may have been evaluated from the perspective of reciprocity. Likewise, the property foundation showed the strongest correlation with the reciprocity domain of MAC. This is consistent with Sinn and Hayes' (2018) approach, as they expect a negative relationship between all seven foundations and opposition to equality. The findings of Study 2 and 3 further yielded significant associations of endorsement of MAC and political ideology as consistent with Study 1, and generalized this finding to a Western sample.

In addition, as Curry et al. (2018) pointed out, the results of the first study suggested that the merging of relevance and judgment scales is often a problem in MFQ since both parts work independently. Therefore, the procedure of combining the scales, often applied in the MFT literature, should be reconsidered. The same is true for MAC-Q because the only scale showing good fit indices is the relevance subscale of MAC-Q in Study 1. That's why we used only the relevance subscale of MAC-Q in Study 2 and 3. Therefore, we suggest that only the relevance subscale would be used to reliably measure the dimensions proposed by MAC.

Although MAC was only recently proposed, it has already received empirical support for the validity of the 7-factor structure of MAC-Q in Turkey, a predominantly Muslim country, and the US, a Western country. This indicates the existence of a new and fruitful theoretical approach

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that can be used in future studies. The fact that we have the opportunity to test the validity of MAC-Q for the first time in a non-Western sample is one of the strengths of this research. However, despite being non-Western, the participants consisted of undergraduate students from three different universities in Turkey. Hence, our data do not represent Turkey as a whole. Future studies should test the claims of the MAC using representative samples.

A prediction that can be derived from MAC was whether the seven dimensions are influenced by environmental factors even though it is thought to be formed through evolutionary adaptations. For example, when there is resource scarcity in an environment, the value given to each foundation might be influenced since it is known that experimentally manipulating resource scarcity increases selfishness (and decreases cooperation; Roux et al., 2015), which in turn might lead to a decreased valuation of all seven foundations. We tested this specific prediction in two large samples—one of them was also preregistered and used a previously-established technique to activate scarcity (Roux et al., 2015)—however, we failed to find any effect of scarcity. Since we did not use a real manipulation check in Study 3 as in the original study (Roux et al., 2015), it is not very clear whether the manipulation worked as we intended. Nevertheless, this null result is consistent with an early meta-analysis showing that the effect sizes in the psychology of scarcity in general (Lynn, 1991) and social psychological research in particular (Richard, Bond, & Stokes-Zoota, 2003) are small in magnitude. Therefore, this specific prediction can be examined by using stronger experimental manipulations in much larger samples that are sensitive to detection of even very small effect sizes (e.g., if one assumes a very small effect size,  $d = .15$ , set alpha at .05 and power at .95, the required sample size will be 2314 to detect this effect in an experimental set-up with two treatments).

In sum, our study suggests that the relevance subscale of MAC-Q is a valid measure to operationalize the MAC's theoretical approach based on game theory and evolutionary biology. Although MFT dominates the field, there was no cross-cultural measurement tool based on MFT

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that was reliable in terms of psychometric properties. A recent cross-cultural study spanning five largest continents also demonstrates this failure of MFQ in universally representing five different foundations (Iurino & Saucier, 2018; but see Doğruyol, Alper, & Yilmaz, 2019). Therefore, a paradigmatic change, similar to the effect MFT had on the field for the past ten years, may be in the making. The fact that MAC-Q is validated in the first independent test in terms of its psychometric properties suggests a high potential impact. However, empirical studies are needed to understand whether the seven-factor structure proposed by MAC is a cross-culturally stable phenomenon.

## References

- Bayramoglu, Y., Harma, M., & Yilmaz, O. (2018). The relationship between attachment to god, prosociality, and image of God. *Archive for the Psychology of Religion*, 40(2-3), 202-224.
- Browne, M. (2001). An overview of analytic rotation in exploratory factor analysis. *Multivar. Behav. Res.* 36, 111–150.
- Curry, O. S. (2016). Morality as cooperation: A problem-centred approach. In T. K. Shackelford & R. D. Hansen (Eds.), *The Evolution of Morality* (pp. 27-51): Springer International Publishing.
- Curry, O. S., Mullins, D. A., & Whitehouse, H. (in press). Is it good to cooperate? Testing the theory of morality-as-cooperation in 60 societies. *Current Anthropology*. doi: <https://osf.io/9546r/>.
- Curry, O. S., Chesters, M. J., Van Lissa, C. J. (in press). Mapping morality with a compass: Testing the theory of ‘morality as cooperation’ with a new questionnaire. <https://osf.io/w5ad8/>.
- Doğruyol, B., Alper, S., & Yilmaz, O. (2019) The five-factor model of the moral foundations theory is stable across WEIRD and non-WEIRD cultures. *Personality and Individual Differences*. 151, 109547.
- Graham, J., Haidt, J., & Nosek, B. A. (2009). Liberals and conservatives rely on different sets of moral foundations. *Journal of Personality and Social Psychology*, 96, 1029-1046.
- Graham, J., Haidt, J., Koleva, S., Motyl, M., Iyer, R., Wojcik, S., & Ditto, P. H. (2013). Moral foundations theory: The pragmatic validity of moral pluralism. *Advances in Experimental Social Psychology*, 47, 55-130.
- Haidt, J. (2001). The emotional dog and its rational tail: a social intuitionist approach to moral judgment. *Psychological Review*, 108(4), 814-834.



## Morality as Cooperation

Haidt, J. (2016). Are moral foundations heritable? Probably. RighteousMind.com.

URL <http://righteousmind.com/are-moral-foundations-heritable-probably/> (accessed 14.11.17).

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world?. *Behavioral and Brain Sciences*, 33(2-3), 61-83.

Herskovits, M. J. (1952). *Economic Anthropology: A Study in Comparative Economics*. New York: Alfred A. Knopf.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1-55.

Iurino, K., & Saucier, G. (2018). Testing Measurement Invariance of the Moral Foundations Questionnaire Across 27 Countries. *Assessment*, doi/10.1177/1073191118817916.

Jordan, J., Mullen, E., & Murnighan, J. K. (2011). Striving for the moral self: The effects of recalling past moral actions on future moral behavior. *Personality and Social Psychology Bulletin*, 37(5), 701–713.

Jost, J. T., Glaser, J., Kruglanski, A. W., & Sulloway, F. J. (2003). Political conservatism as motivated social cognition. *Psychological Bulletin*, 129, 339-375.

Jost, J. T. (2012). Left and right, right and wrong. *Science*, 337(6094), 525–526. doi: 10.1126/science.1222565.

Kohlberg, L. (1969). *Stage and sequence: The cognitive-developmental approach to socialization*. New York: Rand McNally.

Lee, A. J. & Zietsch, B. P. (2011). Experimental evidence that women's mate preferences are directly influenced by cues of pathogen prevalence and resource scarcity. *Biology Letters*, 7, 892-895. doi:10.1098/rsbl.2011.0454

## Morality as Cooperation

- Lynn, M. (1991). Scarcity effects on value: A quantitative review of the commodity theory literature. *Psychology & Marketing*, 8(1), 43-57.
- Marsh, H. W. (2007). "Application of confirmatory factor analysis and structural equation modeling in sport/exercise psychology," in *Handbook of Sport Psychology*, eds G. Tenenbaum and R. C. Eklund (New York, NY: Wiley), 774–798.
- Nilsson, A., & Erlandsson, A. (2015). The Moral Foundations taxonomy: Structural validity and relation to political ideology in Sweden. *Personality and Individual Differences*, 76, 28-32.
- Richard, F. D., Bond Jr, C. F., & Stokes-Zoota, J. J. (2003). One hundred years of social psychology quantitatively described. *Review of General Psychology*, 7(4), 331-363.
- Roux, C., Goldsmith, K., & Bonezzi, A. (2015). On the psychology of scarcity: When reminders of resource scarcity promote selfish (and generous) behavior. *Journal of Consumer Research*, 42(4), 615-631.
- Saribay, S. A., & Yilmaz, O. (2018). Relationships between core ideological motives, social and economic conservatism, and religiosity: Evidence from a Turkish sample. *Asian Journal of Social Psychology*, 21(3), 205-211.
- Shweder, R. A., Much, N. C., Mahapatra, M., & Park, L. (1997). The "big three" of morality (autonomy, community, and divinity), and the "big three" explanations of suffering. In A. Brandt & P. Rozin (Eds.), *Morality and health* (pp. 119–169). New York, NY: Routledge.
- Sinn, J. S., & Hayes, M. W. (2016). Replacing the moral foundations: An evolutionary-coalitional theory of liberal-conservative differences. *Political Psychology*. doi: 10.1111/pops.12361.
- Sinn, J. S., & Hayes, M. W. Is political conservatism adaptive? Reinterpreting right-wing

## Morality as Cooperation

- authoritarianism and social dominance orientation as evolved, sociofunctional strategies. *Political Psychology*. doi: 10.1111/pops.12475
- Smith, K. B., Alford, J. R., Hibbing, J. R., Martin, N. G., & Hatemi, P. K. (2017). Intuitive ethics and political orientations: Testing moral foundations as a theory of political ideology. *American Journal of Political Science*, *61*(2), 424-437. doi: 10.1111/ajps.12255.
- Yalçındağ, B., Özkan, T., Cesur, S., Yilmaz, O., Tepe, B., Piyale, Z. E., Biten, A. F., & Sunar, D. (2019). An investigation of moral foundations theory in Turkey using different measures. *Current Psychology*. *38*, 440-457.
- Yilmaz, O., & Bahçekapili, H.G. (2016). Supernatural and secular monitors promote human cooperation only if they remind of punishment. *Evolution and Human Behavior*, *37*(1), 79-84.
- Yilmaz, O., Harma, M., Bahçekapili, H. G., & Cesur, S. (2016). Validation of the Moral Foundations Questionnaire in Turkey and its relation to cultural schemas of individualism and collectivism. *Personality and Individual Differences*, *99*, 149-154.
- Yilmaz, O., & Saribay, S. A. (2016). An attempt to clarify the link between cognitive style and political ideology: A non-Western replication and extension. *Judgment and Decision Making*, *11*(3), 287-300.
- Yilmaz, O., & Saribay, S. A. (2018). Lower levels of resistance to change (but not opposition to equality) is related to analytic cognitive style. *Social Psychology*, *49*, 65-75
- Yilmaz, O., & Saribay, S. A. (2019). Moral foundations explain unique variance in political ideology beyond resistance to change and opposition to equality. *Group Processes & Intergroup Relations*, *22*(8), 1124-1138.
- Zhang, Y., & Li, S. (2015). Two measures for cross-cultural research on morality: Comparison and revision. *Psychological Reports*, *117*, 144-166.

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**Table 1.** Means and standard deviations of MAC-Q relevance across three studies

	Study 1 ( <i>N</i> =445) <i>M</i> ( <i>SD</i> )	Study 2 ( <i>N</i> =576) <i>M</i> ( <i>SD</i> )	Study 3 ( <i>N</i> =921) <i>M</i> ( <i>SD</i> )
<b>Family</b>	60.56 (23.32)	3.64 (1.10)	66.98 (19.53)
<b>Group</b>	60.37 (22.58)	3.39 (1.07)	63.34 (19.97)
<b>Reciprocity</b>	71.13 (21.57)	3.75 (1.05)	66.75 (20.14)
<b>Heroism</b>	50.17 (23.06)	3.06 (1.21)	63.10 (21.04)
<b>Deference</b>	39.07 (25.41)	2.74 (1.37)	58.14 (21.77)
<b>Fairness</b>	64.98 (21.76)	3.42 (1.11)	58.96 (21.50)
<b>Property</b>	68.68 (22.06)	3.74 (1.10)	63.96 (23.71)

*Note.* A slider between 0-100 was used in the first and third study. A 5-point likert-type scale was used in the second study.

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**Table 2.** Fit indices of the Morality as Cooperation Scale and Moral Foundations Questionnaire in Study 1

Models	$\chi^2$	df	$\chi^2/df$	AIC	CFI	TLI	RMSEA	90%CI	SRMR
<i>Relevance Items – MAC-Q</i>									
1. Seven-factor model	378.433	168	2.253	81388.902	.949	.936	.053	[.046, .060]	.046
2. Seven-factor model (ESEM)	539.892	84	3.214	120464.566	.967	.918	.108	[.100, .117]	.011
3. Single-factor model	1500.428	189	7.934	82468.897	.682	.646	.125	[.119, .131]	.094
4. Two-factor model	1102.354	188	5.864	82071.823	.778	.752	.105	[.099, .111]	.077
5. Two-factor model (ESEM)	1712.165	169	10.131	121466.839	.888	.861	.141	[.135, .147]	.026
6. Second-order (single) factor model	567.530	182	3.118	81549.999	.906	.892	.069	[.063, .076]	.067
7. Second-order (two) factor model	440.489	181	2.456	81424.958	.937	.927	.057	[.050, .064]	.055
<i>Judgment Items – MAC-Q</i>									
1. Seven-factor model	670.522	168	3.991	84030.850	.828	.785	.082	[.075, .088]	.081
2. Seven-factor model (ESEM)	*	*	*	*	*	*	*	*	*
3. Single-factor model	1346.752	189	7.126	84665.079	.604	.560	.117	[.111, .123]	.107
4. Two-factor model	1246.245	188	6.629	84566.572	.638	.596	.112	[.106, .118]	.107
5. Two-factor model (ESEM)	1016.092	169		121525.874	.931	.914	.104	[.098, .110]	.023
6. Second-order (single) factor model	753.117	182	4.138	84087.445	.804	.773	.084	[.078, .090]	.091
7. Second-order (two) factor model	791.510	181	4.373	84125.838	.791	.758	.087	[.081, .093]	.092
<i>Full MAC-Q Items</i>									
1. Seven-factor model	2745.494	798	3.440	165834.635	.752	.732	.073	[.070, .076]	.089
2. Seven-factor model (ESEM)	3073.902	588	5.226	249820.226	.914	.874	.094	[.091, .098]	.016
3. Single-factor model	4352.981	819	5.315	167400.122	.549	.526	.097	[.095, .100]	.105
4. Two-factor model	3738.580	818	4.570	166787.721	.627	.608	.089	[.086, .092]	.102
5. Two-factor model (ESEM)	5836.350	778	7.502	252202.674	.825	.807	.117	[.114, .119]	.034
6. Second-order (single) factor model	3027.658	812	3.729	166088.799	.717	.700	.078	[.075, .080]	.100
7. Second-order (two) factor model	2866.545	811	3.535	165929.686	.738	.722	.075	[.072, .078]	.096
<i>Relevance Items – MFQ</i>									
1. Five-factor model	432.353	80	5.404	20666.357	.858		.100	[.091, .110]	.104
2. Two-factor model	604.488	89	6.792	20814.492	.793		.115	[.017, .124]	.108
<i>Judgment Items – MFQ</i>									
1. Five-factor model	317.706	80	3.971	22943.676	.798		.083	[.073, .092]	.091
2. Two-factor model	424.744	89	4.772	23032.714	.715		.093	[.084, .012]	.093
<i>Full MFQ Items</i>									
1. Five-factor model	1811.561	395	4.586	43687.991	.678		.090	[.086, .095]	.106

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2. Two-factor model	2046.848	404	5.066	43905.278	.626	.096	[.092, .100]	.111
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\*Since the matrices did not converge, model cannot be interpreted.

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**Table 3.** Structural correlations between/within MAC-Q and MFQ dimensions and factor loadings of items in Study 1

	<b>1a</b>	<b>2a</b>	<b>3a</b>	<b>4a</b>	<b>5a</b>	<b>6a</b>	<b>7a</b>	<b>1b</b>	<b>2b</b>	<b>3b</b>	<b>4b</b>	<b>5b</b>
<b>1a.Family</b>	[.692-796]											
<b>2a.Group</b>	0.800***	[.677-774]										
<b>3a.Reciprocity</b>	0.611***	0.746***	[.708-759]									
<b>4a.Heroism</b>	0.657***	0.739***	0.581***	[.711-811]								
<b>5a.Deference</b>	0.421***	0.617***	0.287***	0.569***	[.751-875]							
<b>6a.Fairness</b>	0.525***	0.669***	0.808***	0.544***	0.312***	[.567-670]						
<b>7a.Property</b>	0.560***	0.626***	0.766***	0.441***	0.231***	0.874***	[.524-816]					
<b>1b.Harm</b>	0.267***	0.276***	0.360***	0.278***	0.092*	0.371***	0.404***	[.533-793]				
<b>2b.Fairness</b>	0.241***	0.267***	0.366***	0.163***	0.063	0.406***	0.380***	0.820***	[.767-836]			
<b>3b.Loyalty</b>	0.458***	0.462***	0.395***	0.346***	0.420***	0.254***	0.352***	0.695***	0.696***	[.608-690]		
<b>4b.Authority</b>	0.395***	0.446***	0.206***	0.346***	0.578***	0.190***	0.256***	0.217***	0.328***	0.852***	[.489-707]	
<b>5b.Sanctity</b>	0.438***	0.380***	0.302***	0.353***	0.384***	0.205***	0.274***	0.442***	0.234***	0.808***	0.971***	[.454-684]

\*\*\* p &lt; .001; \*\* p &lt; .01; \* p &lt; .05

Note. Values in the square brackets indicate the minimum and maximum factor loadings.

**Table 4.** Zero-order correlations between social conservatism and MAC-Q subscales in Study 1

	<b>Opposition to Equality</b>	<b>Resistance to Change</b>	<b>Prosociality</b>
<b>Family</b>	.018	.277**	.132**
<b>Group</b>	.024	.198**	.166**
<b>Reciprocity</b>	-.095*	.047	.151**
<b>Heroism</b>	.036	.211**	.044
<b>Deference</b>	.222**	.444**	.011
<b>Fairness</b>	-.175**	-.028	.088
<b>Property</b>	-.154**	.045	.142**
<b>Cooperation (Total Score)</b>	-.021	.231**	.139**

Note. Values in parentheses represent partial correlations controlling for the remaining MAC-Q dimensions.  
 \*\*p < .01; \*p < .05. Although general factor across seven subscales had a limited support for the validity.



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**Table 5.** Correlation among moral foundations and prosociality in Study 2

Variables	1	2	3	4	5	6	7	8
1. Pro-sociality		.20**	.15**	.19**	.10*	.10*	.10*	.15**
2. Family	.19** (.20**)		.68**	.47**	.49**	.33**	.30**	.43**
3. Group	.15* (.14*)	.70** (.66**)		.48**	.52**	.44**	.36**	.42**
4. Reciprocity	.20** (.18**)	.50** (.45**)	.50** (.47**)		.51**	.42**	.49**	.51**
5. Heroism	.12* (.07)	.49** (.48**)	.54** (.49**)	.48** (.54**)		.61**	.37**	.33**
6. Deference	.15** (.05)	.37** (.30**)	.47** (.40**)	.31** (.53**)	.58** (.64**)		.40**	.31**
7. Fairness	.07 (.13**)	.30** (.30**)	.38** (.35**)	.45** (.52**)	.34** (.39**)	.39** (.41**)		.63**
8. Property	.06 (.24**)	.43** (.44**)	.42** (.43**)	.50** (.51**)	.33** (.32**)	.28** (.34**)	.59** (.67**)	

Note. Upper diagonal represents correlation for all participants and lower diagonal represents correlation for manipulation and control groups. Correlations for control groups were presented in parenthesis.

\*  $p < .05$ ; \*\*  $p < .01$ .

## Morality as Cooperation

**Table 6.** Correlation among moral foundations and prosociality in Study 3

Variables	1	2	3	4	5	6	7	8
1. Pro-sociality		.20**	.34**	.21**	.25**	.26**	.25**	.09*
2. Family	.26** (.16**)		.67**	.58**	.61**	.47**	.36**	.29**
3. Group	.33** (.35**)	.66** (.68**)		.57**	.68**	.59**	.47**	.28**
4. Reciprocity	.16** (.25**)	.58** (.58**)	.56** (.59**)		.63**	.54**	.47**	.33**
5. Heroism	.29** (.22**)	.62** (.60**)	.66** (.68**)	.62** (.64**)		.65**	.50**	.31**
6. Deference	.23** (.29**)	.44** (.50**)	.53** (.64**)	.50** (.57**)	.59** (.70**)		.62**	.43**
7. Fairness	.26** (.24**)	.31** (.40**)	.41** (.52**)	.41** (.51**)	.45** (.55**)	.56** (.67**)		.62**
8. Property	.19** (-.01)	.27** (.31**)	.32** (.26**)	.32** (.34**)	.34** (.29**)	.39** (.46**)	.63** (.61**)	

Note. Upper diagonal represents correlation for all participants and lower diagonal represents correlation for manipulation and control groups. Correlations for control groups were presented in parenthesis.

\* $p < .05$ ; \*\* $p < .01$ .