Moral Foundations Theory

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Moral Foundations Theory: Validation and replication of the MFQ-2

Michael Zakharin, Timothy C. Bates *

Department of Psychology, University of Edinburgh, 7 George Square, Edinburgh EH8 9JZ, United Kingdom of Great Britain and Northern Ireland

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ABSTRACT

Moral Foundations Theory (MFT) and its accompanying Moral Foundations Questionnaire (MFQ-1) stimulated a large body of research. A revised version (MFQ-2) was recently released, aimed at improving validity. We report three studies testing this new instrument. Study 1 ($N = 809$) validated the six-foundation structure of the MFQ in U.K. subjects. Study 2 verified this model in independent U.S. data ($N = 835$). The MFQ-2 was also validated against eighteen external criteria (such as religiosity and left- and right-wing authoritarianism). Finally, in Study 3, subjects were recontacted after seven months to test the reliability of the MFQ-2. All foundations demonstrated acceptable reliability (ω-$t = 0.79$ to 0.92). Studies 1 and 2 broadly support the six-foundation structure, with well-fitting item-level models closely matching the proposed structure of the MFQ-2. Group factors of individualizing and group were needed. A nuance is that the Loyalty foundation was split into separate factors for Loyalty to a group and a nation. The MFQ-2 demonstrated good reliability and high validity, predicting 17 out of 18 external-validity scales at statistically significant and substantive levels. The MFQ-2 reliably and validly assesses moral foundations, with improved properties over its predecessor.

Moral Foundations Theory (MFT; Atari et al., 2023; Graham et al., 2013; Iyer, Koleva, Graham, Ditto, & Haidt, 2012) offers a comprehensive model of moral intuitions. The theory was built on insights from earlier theories of moral judgment (e.g., Brown, 2004; Fiske, 1992; Schwartz & Bilsky, 1990; Shweder, Much, Mahapatra, & Park, 1997), combining and integrating these insights with expectations from evolutionary theory. According to MFT, moral behaviour is best viewed as a set of separate, largely-automatic cognitive systems evolved to address recurrent social problems. This model was instantiated in the Moral Foundations Questionnaire (MFQ-1) and rapidly became one of the most widely used instruments in the history of moral psychology. Recently, a revised moral foundations measure has been developed (MFQ-2; Atari et al., 2023), aimed at refinement and psychometric improvement of the questionnaire. Here we report three studies replicating this new six-foundation model, providing a well-fitting item-level structural model for the scale, validated in two cultures and against 18 external criterion scales, and documenting its reliability. We first briefly background the MFT before reporting three studies.

MFT originally proposed five core moral foundations: Care, Fairness, Loyalty, Authority, and Purity. The theory was accompanied by a measure of these foundations – the 30-item Moral Foundations Questionnaire (MFQ-1; Graham et al., 2011). The MFQ-1 rapidly attained wide influence. The first MFQ-1 foundation, *Care*, assesses concerns about avoiding emotional and physical harm to others and a sense of antipathy towards those who commit such acts. The second foundation, *Fairness,* assesses the sense of justice and equality. The third foundation, *Loyalty,* assesses feelings of belonging to one's group and disdain towards those who are disloyal. The fourth foundation, *Authority,* assesses respect and preservation of societal hierarchies and traditions. The fifth foundation, *Purity*, assesses avoidance of contamination and degradation, both physical and spiritual.

While the MFQ-1 has become one of the most widely used instruments in the history of moral psychology, multiple criticisms have been levelled at it. First, the taxonomy of moral foundations has been questioned (e.g., Curry, Jones Chesters, & Van Lissa, 2019; Suhler & Churchland, 2011; Zakharin & Bates, 2021). Second, scores based on the MFQ-1 have been criticized for their limited ability to predict behaviour (Hatemi, Crabtree, & Smith, 2019; Smith, Alford, Hibbing, Martin, & Hatemi, 2017). Finally, the psychometric properties of the original MFQ-1 were unsatisfactory (Graham et al., 2011; Iurino & Saucier, 2018; Zakharin & Bates, 2021). These criticisms, alongside the instrument's utility, strongly motivate the refinement of the MFQ-1, and to address these concerns, a revised moral foundations measure was developed (MFQ-2; Atari et al., 2023).

The modifications made to the MFQ-2 were substantive and substantial. First, the *Fairness* foundation was split into separate *Equality*

* Corresponding author.
E-mail addresses: s1775682@sms.ed.ac.uk (M. Zakharin), tim.bates@ed.ac.uk (T.C. Bates).

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and *Proportionality* foundations. *Equality* represents the egalitarian equality, i.e. the intuition that all individuals should be treated equally and achieve similar results. By contrast, *Proportionality* represents the intuition that individuals should be rewarded based on their merits or contributions. Second, the MFQ-1 had two distinct item formats, "judgment" and "relevance", each having a different question prompt. Judgment items estimated the extent to which participants agreed with a specific moral judgment (e.g., "It can never be right to kill a human being"), whereas "relevance" items measured the moral relevance of various aspects of behaviour (e.g. "Whether or not someone was cruel"). By contrast, the MFQ-2 has only a judgment item format with a prompt "please indicate how well each statement describes you or your opinions". Finally, all items across all six foundations received at least minor modifications in the development process. Having made these design decisions, a pool of 116 candidate items targeting the six foundations was generated, iteratively selected and refined in a total of 25 culturally diverse samples, yielding a final 36-item instrument. This final instrument demonstrated excellent fit to the proposed six-factor model, with an Exploratory Structural Equations Modelling (ESEM: Asparouhov & Muthén, 2014; Marsh, Morin, Parker, & Kaur, 2014) model showing acceptable fit across multiple fit indices (CFI = 0.979, TLI = 0.978, RMSEA = 0.024, SRMR = 0.023).

To demonstrate that MFQ-2 not only had superior psychometric properties internally but also addressed the validity issues raised by other researchers, Atari et al. (2023) tested the validity of the MFQ-2 against 18 external criteria, including such diverse instruments as basic human values (Schwartz, 1992), Right-Wing Authoritarianism (Altemeyer, 2007) and Left-Wing Authoritarianism (Costello et al., 2022). This work indicated that the MFQ-2 had better predictive power than the MFQ-1, explaining 37 % of the variance in outcome variables on average compared to 30 % accounted for by the comparable MFQ-1 scales.

To date, Atari et al. (2023) is the only test of the MFQ-2 of which we are aware. Given the importance of both the theory and practical implications of predicting behaviour using moral judgments, this new questionnaire and underlying model require independent replication. In the present paper, we replicate the Atari et al. (2023) results by testing the replicability of the predicted six-domain structure of the MFQ-2 (Study 1, N = 809 UK participants). We then (Study 2) recruit a U.S. sample (N = 835) and test not only the replicability of the MFQ-2 structure but also its association with 18 external validity tests tested by Atari et al. (2023). Finally, in Study 3, we report MFQ-2 test-retest reliability over seven months.

1. Study 1

In Study 1, we set out to test the factor structure of the MFQ-2 in an independent sample. In particular, we wished to test the replicability of the six-foundation model developed by Atari et al. (2023) in a conventional structural equation modelling framework. Our approach was as follows. First, we planned to confirm the unifactorial structure of each of the MFQ-2 domains. Second, we tested whether the predicted six-factor structure, with group factors of binding and individualizing, would offer a good fit to the data at an item level.

2. Method

2.1. Participants

A total of 809 participants (401 females, 402 males, 6 other; age range 18–79 years, mean age 42.31 years, SD = 14.27) from the U.K. were recruited using Prolific Academic, a large online platform for recruiting research subjects. The ethnic composition of the sample was representative of the U.K., with 727 participants identifying as White (89.9 %), 22 as Black (2.7 %), 27 as Asian (3.3 %), 27 as mixed ethnicity (3.3 %), and 6 as other (0.7 %). The study was approved by the Psychology Research Ethics Committee at the School of Philosophy, Psychology & Language Sciences at the University of Edinburgh. All participants gave informed consent.

2.2. Materials and procedure

Materials consisted of the MFQ-2 (Atari et al., 2023). Testing was done using the Qualtrics online survey platform. After giving informed consent, each participant was asked to complete the MFQ-2 questionnaire. Total testing took approximately 4 min per participant on average.

Model fit was assessed by the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and the root mean square error of approximation (RMSEA). The comparative fit of the models was assessed by the Akaike Information Criterion (AIC; Akaike, 1983), which penalises unparsimonious models. All statistical analyses were completed in R (R Development Core Team, 2021) and umx (Bates, Maes, & Neale, 2019).

3. Results

Descriptive statistics and Omega total reliability coefficients (Revelle, 2022) are shown in Table 1. Omega total coefficients ranged from 0.82 to 0.90 suggesting good internal consistency of the six foundations.

We first tested single-factor models of each of the six individual foundations. With the exception of Loyalty (χ^2 (9) = 200.94, $p < .001$; CFI = 0.904; TLI = 0.84; RMSEA = 0.126), one-factor models of each foundation fit well. However, to achieve a satisfactory model fit, it was necessary to correlate two items in the Authority factor ("*I think it is important for societies to cherish their traditional values*" and "*I feel that most traditions serve a valuable function in keeping society orderly*") and in the Purity factor ("*I think the human body should be treated like a temple, housing something sacred within*" and "*People should try to use natural medicines rather than chemically identical human-made ones*"). These correlations indicate the presence of distinctive shared variations within these pairs, possibly related to the values of tradition and bodily purity, respectively. Regarding Loyalty, three items measuring this foundation target Loyalty to the country (e.g., "*Everyone should defend their country if called upon*") and another three – loyalty to one's group (e.g., "*Everyone should love their own community*"). Therefore, we tested a model of Loyalty with two correlated factors, measuring group loyalty and country loyalty, with each factor having three items. This two-factor model fit well, $\chi^2(8)$ = 22.74, p = .004; CFI = 0.993; TLI = 0.986; RMSEA = 0.037. The correlation between the two loyalty factors was high, r = 0.69. This result is compatible with earlier findings that loyalty is divided into group loyalty and country loyalty (Zakharin & Bates, 2021). Table 1 shows the fit for single-factor models for all six factors. Fig. 1 shows all univariate models used in Study 1.

We next moved to build and test an item-level model of the entire questionnaire. Our expected model contained seven factors (including two Loyalty factors), with two higher-order factors of individualizing and binding. We reached this expectation based on 1) the finding above

Table 1
Descriptive statistics and fit for single factor (or modified) models for each of the six foundations individually.

Foundation	M	SD	CFI	TLI	RMSEA	Omega total
Care	3.97	0.77	0.984	0.974	0.061	0.91
Equality	2.97	0.98	0.997	0.995	0.026	0.88
Proportionality	3.54	0.75	0.986	0.977	0.042	0.82
Authority	3.08	0.95	0.951	0.918	0.101	0.90
Loyalty 2-factor model	2.83	0.92	0.993	0.986	0.037	0.90
Purity	2.16	0.85	0.984	0.974	0.061	0.91

Note: CFI = Comparative Fit Index; TLI = Tucker Lewis index; RMSEA = Root Mean Square Error of Approximation.

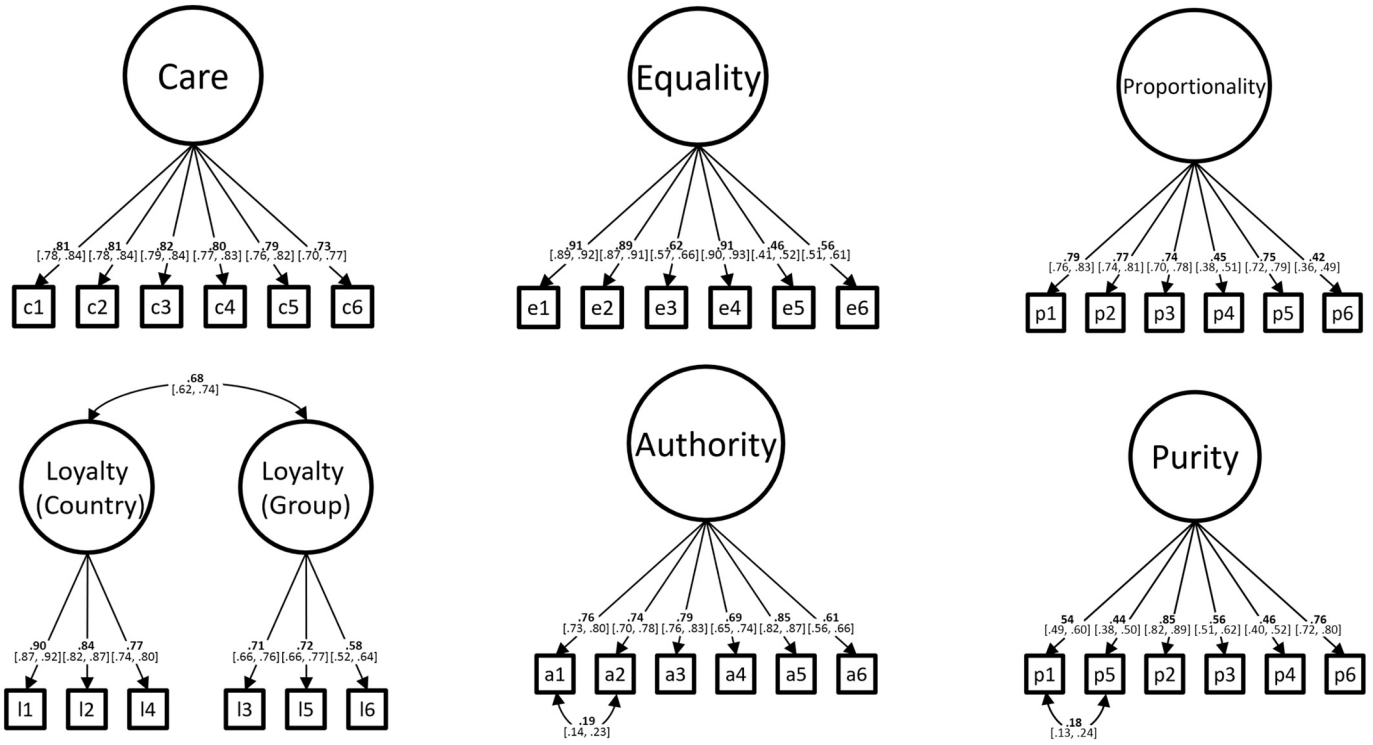

Fig. 1. Univariate structural equation models of the six moral foundations in Study 1.

that Loyalty involves two factors, and 2) strong evidence from the MFQ-1 (Graham et al., 2011; Smith et al., 2017; Zakharin & Bates, 2021), and from Atari et al. (2023) for the MFQ-2 for higher-order factors of binding (loading on Loyalty, Authority, Proportionality, and Purity) and individualizing (loading on Care and Equality), emerging in Western samples.

While the constructs of Binding and Individualizing were initially incorporated into the model based on theoretical grounds, our intention was to subsequently simplify the model by introducing cross-loadings of items on multiple factors and correlations between individual items. This post-hoc adjustment aimed to account for residual covariance in the data that was not predicted by the strict MFQ2 model but observed and found to be significant in our dataset.

In testing this expected model, we began by testing a simpler base model – the hypothesis that six (correlated) factors are sufficient to explain the variance in the MFQ-2. This model had an unsatisfactory fit, χ^2 (579) = 2170.85, $p < .001$; CFI = 0.899; TLI = 0.890; RMSEA = 0.058.

Next, we tested whether a seven-factor model, splitting Loyalty into two factors and adding higher-order factors of individualizing and binding (loading on Care, Equality, Group Loyalty, and Proportionality, Authority, Group Loyalty, Country Loyalty and Purity, respectively) would fit the data better (see model 2 in Table 2). This, indeed, resulted in a better, but still unsatisfactory, fit (χ^2 (586) = 1943.96, p < .001; CFI = 0.914; TLI = 0.908; RMSEA = 0.054). We then added six cross-loadings, as suggested post-hoc by residual correlations yielding a well-fitting model (see model 3, Table 2).

We also tried to improve the six-factor model, i.e., to generate a well—fitting model that avoids dividing the Loyalty foundation, but still adding needed cross-loadings to the model (shown as model 4 in Table 2). We were able to enhance the performance of the six-factor model by incorporating the same six cross-loadings used in the seven-factor model (we introduced a cross-loading between Loyalty and one of the Equality items instead of using Group Loyalty as in the seven-factor model). However, this alternative model demonstrated a poorer fit compared to Model 3. The fit of these three models is shown in Table 2. This final model (Model 3) is shown graphically in Fig. 2.

Table 2
MFQ-2 model fit comparisons in Study 1.

Model		EP	CFI	TLI	RMSEA	AIC
1.	Six-Factor model	123	0.899	0.890	0.058	75,301.79
2.	Seven-Factor Hierarchical model	116	0.914	0.908	0.054	75,060.90
3.	**Modified Seven-Factor Hierarchical model**	**128**	**0.953**	**0.948**	**0.040**	**74,459.85**
4.	Modified Six-Factor Hierarchical model	127	0.931	0.925	0.048	74,797.96

Notes. E.P. = the number of estimated parameters; AIC = Akaike information criteria; the best fitting model is printed in bold.

4. Study 1 discussion

The main outcomes of Study 1 were as follows. First, the six foundation scales of the MFQ-2 were each validated as fitting as unidimensional according to accepted fit criteria, with the notable exception of Loyalty. This foundation was split into loyalty to group and country to create a well-fitting model. While not predicted by MFT, this group/country distinction for loyalty has been identified previously, e.g., in the MFQ-1 (Zakharin & Bates, 2021). Considering the evolutionary basis of the Moral Foundations Theory, it could be argued that loyalty to a nation, a relatively recent phenomenon in evolutionary terms, may stem from the fundamental concern for group-based solidarity, which has deeper evolutionary roots.

A second main outcome was that a well-fitting model of all MFQ-2 foundations could be produced using item-level data, as shown in Fig. 2. This provides substantial confidence in the overall MFQ-2 structure, particularly as we used a large sample and modelled the scale to the more challenging item level rather than the scale level. The overall model showed clearly that features of MFT present in the MFQ-1 were maintained, in particular, the substantial role of the higher-order

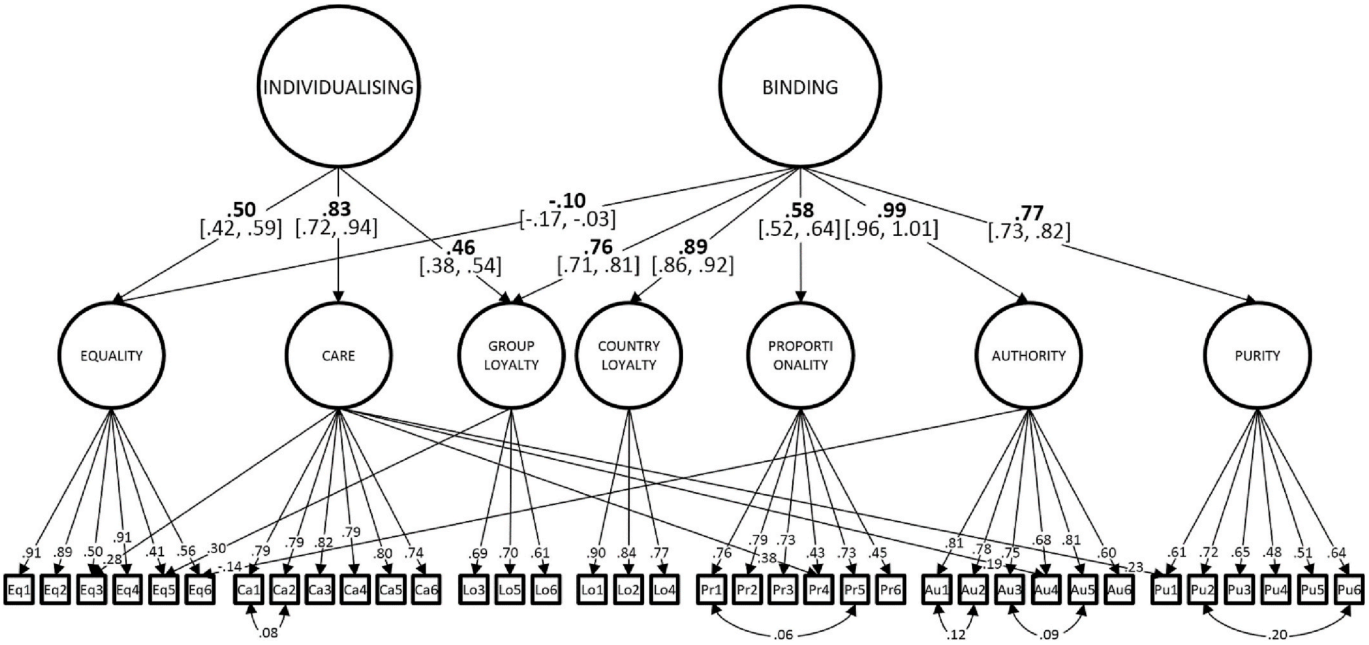

Fig. 2. The final item-level model of MFQ-2 in Study 1 (U.K. data).

binding and individualizing factors (Harper & Rhodes, 2021; Nilsson, 2022; Zakharin & Bates, 2021). The two-part structure of Loyalty was retained in this overall model (See Fig. 2). Country Loyalty was allocated to the binding domain, while Group Loyalty was influenced by both the binding and individualizing domains, suggesting that concern for one's community is conceptually linked to concerns for Care and Equality, as well as to group concerns.

Some modifications to the model from the initial expectation were required in the form of six cross-loadings, listed below. Perhaps reflecting the out-sized role of compassion in writing the MFQ-2 items, four of these modifications were related to the Care domain. These cross-loading additions were post hoc but appeared compatible with MFT. The Care foundation required a positive loading on the Equality item: "*I believe that everyone should be given the same quantity of resources in life*". This was the only Equality item where active help providing was explicitly stated. Most other Equality items are phrased more passively, concerning what ideal society should look like (e.g. "*The world would be a better place if everyone made the same amount of money*"). Care also required a loading on the Proportionality item: "*It makes me happy when people are recognized on their merits*". This Proportionality item was distinguished by mentioning a positive emotion for others. Care required a positive loading on the Authority item: "*We all need to learn from our elders*". This item was performed well as an indicator of Authority, but was distinguished from other items by its focus on the wisdom of elders. Finally, Care required a positive loading on the Purity item: "*I think the human body should be treated like a temple, housing something sacred within*". This item, focusing on health, is clearly relevant to the Care foundation. By contrast, most other Purity items focus more on virtues of sexual restraint.

Other modifications were as follows. The new Group Loyalty foundation required a positive loading on the Equality item: "*When people work together toward a common goal, they should share the rewards equally, even if some worked harder on it*". This was the only Equality item concerning group work. The Authority foundation required a negative loading on the following Equality item: "I get upset when some people have a lot more money than others in my country". Possibly, this link was required because this item was the only Equality item expressing a negative emotion. Finally, five item-item covariances were required, likely because of similar item wording: e.g., a covariance between two Care items emphasising empathy with those who suffer: "*Caring for people who have suffered is an important virtue*" and "*I believe that compassion for those who are suffering is one of the most crucial virtues*". A covariance was needed between two Proportionality items emphasising virtues of hard work: "*I think people who are more hard-working should end up with more money*" and "*In a fair society, those who work hard should live with higher standards of living*".

For Authority, two items emphasising the importance of traditions covaried: "*I think it is important for societies to cherish their traditional values*" and "*I feel that most traditions serve a valuable function in keeping society orderly*". A correlational link was also required between two items linked to parenting: "*I think obedience to parents is an important virtue*" and "*I believe that one of the most important values to teach children is to have respect for authority*". Finally, a covariance between the Purity items emphasising the importance of chastity was added, linking "*I believe chastity is an important virtue*" and "*I admire people who keep their virginity until marriage*". As these modifications were post-hoc, they require replication, which we undertake in Study 2.

5. Study 2

In Study 2, we aim to replicate all the findings of Study 1 and demonstrate them in a different culture, the United States. We also wished to test the replication of the 18 external validity scales reported by Atari et al. (2023). These authors approached the question of validation using a correlation approach, showing the univariate correlation of each external scale with each target MFQ foundation. While we also tested univariate correlates, we extended this analysis with a complete examination, using linear models with all 6 MFQ-2 foundations as predictors for each outcome. The 18 external validity scales are described in the materials below. Briefly, Atari et al. (2023) expected Care foundation to be positively associated with the empathic concern subscale of the Interpersonal Reactivity Index (Davis, 1983), benevolence domain of the Schwartz Values Survey (Schwartz, 1992), and negatively with the Levenson Self-Report Psychopathy Scale (Levenson, Kiehl, & Fitzpatrick, 1995). Equality foundation was expected to be positively related to the Support for Redistribution Scale (Petersen, Sznycer, Sell, Cosmides, & Tooby, 2013), social justice and equality values of the Schwartz Values Survey (Schwartz, 1992), and negatively to Social Dominance Orientation (Ho et al., 2015). The Proportionality foundation was expected to be positively associated with the Preference for the Merit Principle Scale

(Davey, Bobocel, Son Hing, & Zanna, 1999), the Success value of the Schwartz Values Survey (Schwartz, 1992) and Belief in a Just World (Dalbert, 1999). The Loyalty foundation was expected to be positively associated with the Collectivism scale (Triandis & Gelfand, 1998), the Loyalty, National Security, and Family Security values of the Schwartz Values Survey (Schwartz, 1992) and the Group Loyalty Scale (Beer & Watson, 2009). The Authority foundation was expected to be positively associated with the Right-Wing Authoritarianism scale (Altemeyer, 2007), the Left-Wing Authoritarianism scale (Costello et al., 2022) and the Tradition, Obedience, Social Order and Respect values of the Schwartz Values Survey (Schwartz, 1992). The Purity foundation was expected to be positively associated with the Disgust Scale-Revised (Olatunji et al., 2007), Duke University Religion Index (Koenig & Büssing, 2010), and the Clean, Devout, Spiritual, and Self-disciplined domain of the Schwartz Values Survey (Schwartz, 1992). All these predictions were borne out in the Atari et al. (2023) data, showing significant correlations in the predicted direction except for the association between the Authority foundation and Left-Wing Authoritarianism, which was not statistically significant.

6. Method

6.1. Participants

A total of 835 participants (417 females, 417 males, age range 18–93 years, mean age 39.35 years, SD = 14.92) from the U.S. were recruited using Prolific Academic, a large online platform for recruiting research subjects. The ethnic composition of the sample was representative of the U.S., with 587 participants identifying as White (70.2 %), 107 as Black (12.8 %), 73 as Asian (8.7 %), 5 as Native American (0.6 %), and 62 as other (7.4 %). The study was approved by the Psychology Research Ethics Committee at the School of Philosophy, Psychology & Language Sciences at the University of Edinburgh. All participants gave informed consent.

6.2. Materials

Materials consisted of the MFQ-2 (Atari et al., 2023) and the 18 external scales used to validate the MFQ-2, described below. We also included a measure of political ideology and voting behaviour.

The MFQ-2 (Atari et al., 2023) is a 36-item instrument measuring the endorsement of six moral foundations. Each foundation is assessed with six items using a five-point Likert scale ranging from "Does not describe me at all" to "Describes me extremely well".

Schwartz Values Survey (SVS; Schwartz, 1992). SVS is a 56-item survey of human values. SVS consists of 30 items describing the importance of goals (e.g. "equality", "freedom"," pleasure") and 26 items describing the importance of possessing a particular trait (e.g. "curious", "responsible", "moderate"). Each item is rated on a 9-point scale ranging from 7 (of supreme importance) to −1 (opposed to my values).

Levenson Self-Report Psychopathy Scale (LSRP; Levenson et al., 1995). LSRP is a 26-item instrument measuring psychopathy. 16 items measure primary psychopathy associated with callous manipulative behaviour (e.g. "For me, what's right is whatever I can get away with"), and 10 items measure secondary psychopathy associated with risky, impulsive behaviours (e.g. "I find myself in the same kinds of trouble, time after time"). LSRP is rated on a 4-point Likert scale ranging from 1 (Strongly disagree) to 4 (Strongly agree).

Support for Redistribution Scale (SRS; Petersen et al., 2013) is a six-item measure of support for economic redistribution (e.g. "The wealthy should give more money to those who are worse off"). SRS is rated on a 7-point Likert scale ranging from 1 (Strongly disagree) to 7 (Strongly agree).

Preference for the Merit Principle Scale (PMPS; Davey et al., 1999) is a 15-item measure of preference for allocating rewards in proportion to people's contributions rather than according to egalitarianism (e.g. "In life, people ought to get what they deserve"). PMPS is rated on a 7-point Likert scale ranging from 1 (Strongly disagree) to 7 (Strongly agree).

Emphatic Concern (E.C.). E.C. is a 7-item subscale of the Interpersonal Reactivity Index (IRI; Davis, 1983). E.C. measures sympathy and concern for others in unfortunate circumstances (e.g., "I often have tender, concerned feelings for people less fortunate than me"). E.C. is rated on a 5-point Likert scale ranging from 1 (Does not describe me well) to 5 (Describes me very well).

Social Dominance Orientation (SDO; Ho et al., 2015). SDO is a 16-item measure of support of group-based hierarchy and inequality (e.g., "Some groups of people are simply inferior to other groups"). SDO is rated on a 7-point Likert scale ranging from 1 (Strongly oppose) to 7 (Strongly favour).

Belief in a Just World (BJW; Dalbert, 1999). BJW is a 6-item measure of participants' belief that we live in a just and benevolent world (e.g. "I think basically the world is a just place"). BJW is rated on a 6-point Likert scale ranging from 1 (Strongly disagree) to 6 (Strongly agree).

Group Loyalty Scale (GLS). GLS is an 8-item subscale of the Individual and Group Loyalty Scales (IGLS; Beer & Watson, 2009). The GLS measures participants' commitment to their social groups (e.g. "I am loyal to my country"). GLS is rated on a 5-point Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree).

Individualism and Collectivism Scale (ICS; Triandis & Gelfand, 1998). ICS is a 16-item measure of support for individualism (8 items; an example item is "I rely on myself most of the time; I rarely rely on others") and collectivism (8 items; an example item is "It is important to me that I respect the decisions made by my groups"). ICS is rated on a 5-point Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree).

Right-Wing Authoritarianism (RWA; Altemeyer, 2007). RWA is a 22-item measure of a right-wing authoritarian personality which features submission to the traditional authorities and social conventions as well as hostility to those who oppose the established hierarchies. RWA is rated on a 9-point Likert scale ranging from −4 (Very strongly disagree) to 4 (Very strongly agree).

Disgust Scale-Revised (DSR; Olatunji et al., 2007). DSR is a 25-item measure of three types of disgust: core disgust (12 items), animal reminder disgust (8 items) and contamination disgust (5 items). DSR includes 13 statements (e.g. "It would bother me to see a rat run across my path in a park") rated on a binary scale (0 = False, 1 = True) and 12 imaginary situations (e.g. "You are about to drink a glass of milk when you smell that it is spoiled"), rated on a three-point scale (0 = Not disgusting, 0.5 = Slightly disgusting, 1 = Very disgusting). Scores for each of the three subscales are calculated by summing corresponding items, and the total disgust scale is calculated by summing the total 25 items.

Duke University Religion Index (DUREL; Koenig & Büssing, 2010). The DUREL is a 5-item measure of religiosity. Two items measure the frequency of praying and attending religious meetings and are rated on a 6-point Likert scale. Three items measure various religious experiences (e.g. "In my life, I experience the presence of the Divine") and are rated on a 5-point Likert scale ranging from 1 (Definitely not true) to 5 (Definitely true of me).

Left-Wing Authoritarianism (LWA; Costello et al., 2022). LWA is a 39-item measure of authoritarianism associated with left-wing politics and goals (e.g., "I would prefer a far-left leader with absolute authority over a right-wing leader with limited power"). LWA is rated on a Likert scale ranging from 1 (Strongly disagree) to 7 (Strongly agree).

Political Ideology and Voting Intention. Political ideology was measured using a one-item question ("How would you characterise your political views?") with a seven-point ideology scale ranging from 1 (Extreme Left) to 7 (Extreme Right). The voting intention was measured using a one-item question ("Do you usually vote in general elections?")

with a 5-point Likert response scale ranging from 1 (Never) to 5 (Always).

6.3. Procedure

Testing was done using the Qualtrics online survey platform. After giving informed consent, each participant completed all scales presented in the Materials section. To minimize potential order effects, the presentation order of the questionnaires was randomized for each participant. All data were de-identified and collected using anonymous codes to protect participants' privacy. No personal identifying information was collected, and the authors did not have access to any information that could identify individual participants during or after data collection.

7. Results

We first tested the replication of the single-factor models of the individual foundations. Table 3 shows the fit for single-factor models for all six foundations (figures showing the item loadings are presented in the online supplement), as well as descriptive statistics and reliability (Omega total). We then fitted the exact model developed in Study 1 to the new dataset collected for Study 2 and examined its fit. The model replicated, showing excellent fit to this independent dataset, collected in a different country than that used in Study 1 (χ^2 (574) = 990.79, $p < .001$; CFI = 0.960; TLI = 0.956; RMSEA = 0.04). In addition to a good fit, factor loadings were also comparable to those found in Study 1. The replicated model is shown in Fig. 3.

7.1. External validation tests

Next, we tested the external validity of the MFQ-2 scales. We used the method reported by Atari et al. (2023); namely, for each of the 18 external validity scales, we tested its correlation with the MFQ-2 foundation predicted by Atari et al. (2023) to be most strongly related to that external scale. We also extended this method, running a linear model for each external scale in which all 6 MFQ-2 foundations were entered as predictors. This allowed us to test whether the predicted domain was the strongest predictor of the outcome in each case, how other MFQ-2 domains related to each outcome and what the total R^2 was for the prediction of each external scale using the whole MFQ-2 scale. Table 4 shows a summary comparing each of the 18 predictions and findings from Atari et al. (2023) alongside the confirmation test of each prediction in the present study.

Replicating Atari et al. (2023) results, we found that 17 out of 18 predicted relationships between the moral foundations and external criteria were in the expected direction and significant (see Table 5). The only exception was we obtained a negative relationship between the Authority foundation and the LWA scale despite this being predicted to be positive. Atari et al. (2023) also failed to find a positive relationship, finding instead a null relationship between these two variables.

The regression analyses provided and interesting nuance on the external validity of the MFQ 2: most of the external criteria were better explained by multiple moral foundations working together than by a single foundation. Indeed, foundations other than predicted ones sometimes had the largest effect (see Table 6). Finally, supporting the predictive power of the MFQ 2, moral foundations explained 54 % of the variance in external scales on average. Due to the problem of multicollinearity, it is not possible to include both Loyalty and the two components, Loyalty to nation and Loyalty to group simultaneously in the linear regressions. To illustrate the functioning of these distinct analyses, we have included an additional table in the Appendix demonstrating the predictive effects of Loyalty to the nation and Loyalty to the group as separate predictors.

Table 3
Model fit for each of the individual MFQ-2 foundations (Study 2).

Foundation	CFI	TLI	RMSEA	Omega total
Care	0.977	0.962	0.102	0.92
Equality	0.994	0.989	0.054	0.90
Proportionality	0.980	0.963	0.068	0.82
Authority	0.983	0.967	0.089	0.90
Loyalty 2-factor model	1.0	1.0	0	0.89
Purity	0.95	0.916	0.073	0.79

8. Study 2 discussion

By employing a combination of the Moral Foundations Questionnaire (MFQ) and external validity measures, it becomes possible to situate these attitude and morality measures within the framework of the MFT. Study 2 yielded three important findings in this regard. First, we successfully replicated the seven-factor model of the MFQ-2 in a second independent dataset. Second, we successfully replicated all of the significant external validity results in Atari et al. (2023). Third, several of the external scales correlated with more than one foundation, and some of these additional correlations were large, e.g., SDO correlated significantly with both its target (Equality) but also almost as strongly, and negatively with Care, as well as less strongly, with Authority and Purity) suggesting roles for additional MFT foundations in a multivariate account of external scales. These points are elaborated below.

Concerning the successful replication, the model fit metrics were excellent and comparable to those in Study 1. All paths in the model from Study 1 (including cross-loadings and item-item covariances) were significant in Study 2. We can have confidence, therefore, that this model of MFQ-2 is replicable. At the same time, we think there is a potential for improving the questionnaire's efficiency. One possible avenue for improvement involves considering the removal or rephrasing of specific items to foster greater independence among the moral foundations.

Concerning the second major outcome, we were able to replicate all of the significant external validity results reported in Atari et al. (2023). Each of the MFQ-2 foundations was associated with all three of its external criterion measures, with the one exception. Specifically, the Authority foundation correlated significantly negatively with LWA, which contrasts with Atari et al. (2023), who predicted that this relationship would be positive but found no relationship.

Political values are an important predictive outcome of MFT (Franks & Scherr, 2015; Graham, Haidt, & Nosek, 2009). The MFQ-2 predicted participants' self-placement on a political left-wing to right-wing scale in the expected direction (positive associations between right-wing ideology and binding foundations and negative for individualizing foundations), confirming that moral foundations are associated with political values, and MFQ-2 is a valid measure of political ideology.

Expanding on the external validity findings, by moving beyond zero-order associations and jointly examining all six MFQ-2 foundations as predictors for each external marker, we gained valuable insights in two important ways. First, these multivariate models showed that moral foundations jointly explained over half the variance (on average) of the external scales, ranging from as low as 0.07 for disgust sensitivity to as high as 0.70 for group loyalty. The second, related, value of the regression approach for assessing external validity was that several cases emerged in which an external scale was predicted by more than one MFQ-2 foundation. For instance, SDO (Ho et al., 2015) correlated significantly both with its target foundation (Equality) and the authority foundation. The Benevolence scale (Schwartz, 1992) correlated with its predicted foundation (Care) but just as strongly with Authority and Purity. One reason for this may be that the benevolence domain is quite diverse, consisting of items that are relevant to Care (e.g., *Helpful, Honest* and *Forgiving*), but also items *such as Loyal* and *Responsible* – which have face validity for targeting Authority – and *A spiritual life*, *True friendship*, *Mature love* and *Meaning in life* that have clear theoretical relevance for

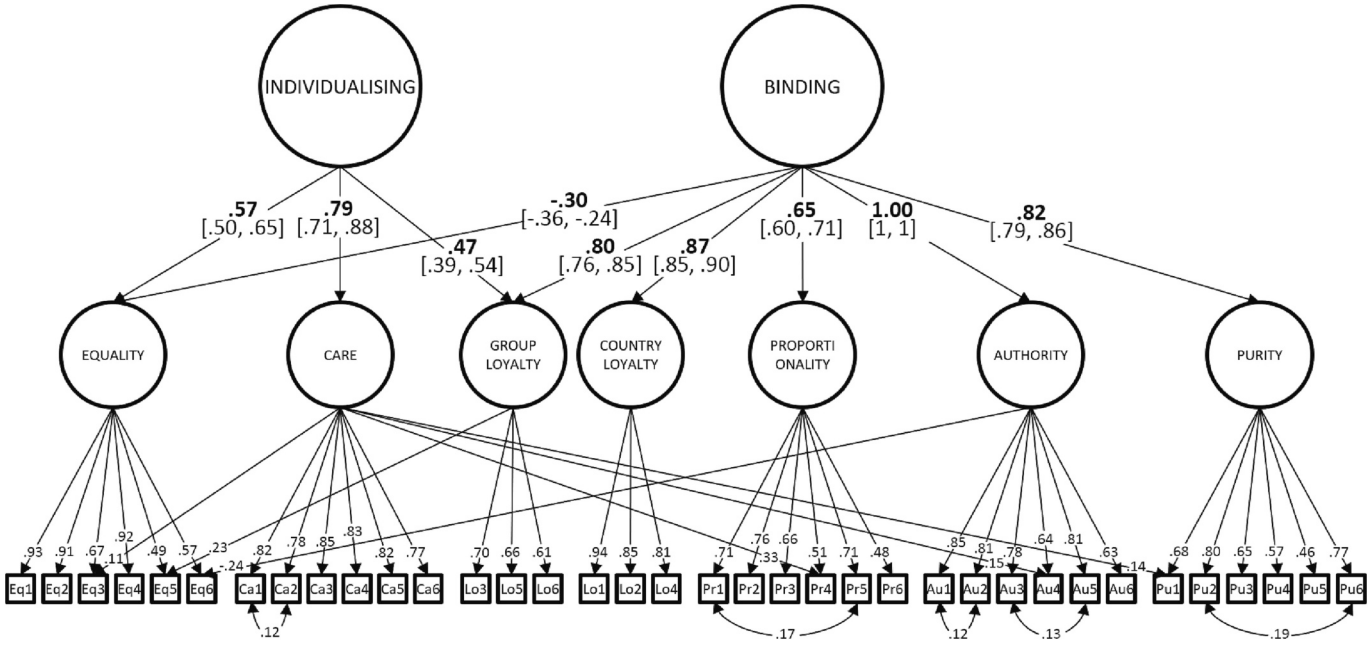

Fig. 3. The final item-level model of MFQ-2 in Study 2 (U.S. data).

Table 4
Relationships between MFQ-2 Scores and External Measures showing direction of prediction (on Atari et al., 2023 and whether the association replicated in the present study.

MFQ2 foundation and proposed external criteria	Prediction (Atari et al., 2023)	Replication (present study)
Care and empathic concern	Positive	Yes
Care and SVS: benevolence	Positive	Yes
Care and psychopathy	Negative	Yes
Fairness and support for redistribution	Positive	Yes
Fairness and social dominance orientation	Negative	Yes
Fairness and SVS: social justice and equality	Positive	Yes
Proportionality and SVS: success	Positive	Yes
Proportionality and preference for the merit	Positive	Yes
Proportionality and belief in a just world	Positive	Yes
Loyalty and SVS: loyalty, national security, and family security	Positive	Yes
Loyalty and collectivism	Positive	Yes
Loyalty and group loyalty	Positive	Yes
Authority and SVS: tradition, obedience, social order, respect and authority	Positive	Yes
Authority and right-wing authoritarianism	Positive	Yes
Authority and left-wing authoritarianism	ns, but expected positive	No, was negative
Purity and SVS: clean, devout, spiritual, and self-discipline	Positive	Yes
Purity and disgust sensitivity	Positive	Yes
Purity and religiosity	Positive	Yes

Purity concerns. Finally, the Social Justice and Equality values extracted from the SVS (Schwartz, 1992) and used as a scale by Atari et al. (2023) correlated equally well with Equality, its predicted foundation, and with Care. This suggests that the formation of a scale from these two values may have confounded distinct moral foundations, with equality value tapping Equality and the social justice concern tapping Care, and the sum of these values, therefore, associated with both foundations.

An interesting finding regarding the prediction of political orientation and voting activity emerged from our study. We observed that left-versus-right political orientation could be effectively predicted by the moral foundations of Care, Equality, Authority, and Purity. Together, these foundations accounted for more than half of the variance in political orientation. However, in contrast, voting behaviour appeared to be largely independent of moral foundations. The only notable predictor, with a negative relationship, was Purity, and it explained only a modest 2 % of the variance in voting frequency.. This discrepancy may be attributed to the greater variability in behavioural measures, as political attitudes tend to remain stable over time (Peterson, Smith, & Hibbing, 2020) while voting turnout is less consistent (Matsusaka & Palda, 1999).

The one external predictor which notably failed to behave as predicted was LWA. While RWA was positively associated with the Authority foundation, LWA was negatively associated with this foundation, and, in addition, was strongly positively associated with the Equality foundation. This suggests that, despite its name, the LWA scale either does not measure authoritarianism (as suggested by the near-zero association reported by Atari et al. (2023)) or, compatible with the present results, that LWA measures opposition to authority, in some admixture with egalitarian attitudes. The empirical viability of LWA has been a source of considerable debate (e.g., Conway, Houck, Gornick, & Repke, 2018; Conway, Zubrod, Chan, McFarland, & Van de Vliert, 2022; Fasce & Avendaño, 2020; Stone, 1980). Future research may utilise the MFQ 2 scales to help inform the validity or lack thereof of the LWA construct. In particular, research is needed to test whether left-wing extremists are low or even negative on authority (as the present results suggest) and thus do not wish to establish a left-wing authority but rather wish to remove all authority, leaving the void instead.

9. Study 3

Having confirmed the structure and external validity of MFQ-2 in studies 1 and 2, as a final addition, we wished to estimate the test-retest reliability of the new scales. Poor reliability limits the power of studies using a measure, and while studies one and two indicated good internal reliability for the MFQ-2, test-retest reliability provides an additional measure of reliability as well as insight into the stability of traits. To examine test-retest reliability, we recontacted all participants seven months after initial MFQ-2 data were collected in Study 1, and asked them to take the MFQ-2 a second time, allowing us to compute the Intraclass Correlation Coefficient reliability (Bartko, 1966) of each scale

Table 5
Correlations between each of the 18 external validity criteria and MFQ-2 foundation scores.

Criterion Variables	Care	Equality	Proportionality	Loyalty	Loyalty (Country)	Loyalty (Group)	Authority	Purity	ω-t
Empathic Concern	.73***	.31***	.06	.16**	0.07*	0.24***	.08*	.13***	.90
SVS: Benevolence	.47***	.10**	.30***	.43***	0.33***	0.45***	.47***	.47***	.83
Psychopathy	-.45***	-.06	-.04	-.03	-0.02	-0.04	.00	-.04	.88
Support for Redistribution	.35***	.67***	-.31***	-.33***	-0.41***	-0.13***	-.45***	-.36***	.88
Social Dominance Orientation	-.42***	-.56***	.20***	.29***	0.37***	0.12***	.38***	.30***	.94
SVS: Social Justice and Equality	.56***	.51***	-.02	.01	-0.10**	0.15***	-.10**	-.05	--
SVS: Success	.01	-.11**	.31***	.32***	0.23***	0.36***	.33***	.26***	--
Preference for Merit	.00	-.38***	.58***	.29***	0.28***	0.24***	.34***	.25***	.81
Belief in a Just World	-.04	-.24***	.34***	.47***	0.45***	0.39***	.51***	.42***	.86
SVS: LNSFS	.25***	-.10**	.47***	.61***	0.57***	0.52***	.61***	.44***	.62
Collectivism	.44***	.06	.34***	.59***	0.48***	0.60***	.56***	.45***	.79
Group Loyalty	.08*	-.25***	.47***	.81***	0.82***	0.62***	.74***	.56***	.92
SVS: TOSRA	.08*	-.18***	.46***	.68***	0.65***	0.56***	.78***	.62***	.79
Right-Wing Authoritarianism	-.14***	-.37***	.36***	.58***	0.63***	0.37***	.71***	.71***	.96
Left-Wing Authoritarianism	.16***	.58***	-.22***	-.28***	-0.38***	-0.08*	-.35***	-.25***	.92
SVS: CDSS	.15***	-.14***	.35***	.53***	0.49***	0.45***	.64***	.73***	.75
Disgust Sensitivity	.12***	.00	.18***	.19***	0.16***	0.20***	.19***	.26***	.84
Religiosity	.14***	-.15***	.22***	.42***	0.44***	0.31***	.48***	.62***	.93
Political Ideology	-.24***	-.52***	.34***	.45***	.53***	.25***	.57***	.53***	--
Voting in elections	.03	-.04*	-.08*	-.04	-.03	-.05	-.06	-.13***	--

Note. Cells containing a relationship expected to be significant are highlighted with a gray background. ω-t is Omega total scale reliability. LNSFS: Loyalty, National Security, and Family Security Schwartz values. TOSRA: Tradition, Obedience, Social order, Respect and Authority from the Schwartz values. CDSS: Clean, Devout, Spiritual, and Self-discipline Schwartz values. ***p < .001, **p < .01, *p < .05.

Table 6
Regression analyses predicting each external criterion using all six moral foundations as predictors.

Criterion Variables	Care	Equality	Proportionality	Loyalty	Authority	Purity	R^2
Empathic Concern	.75***	-0.02	-.09**	.05	-.03	.03	.54
SVS: Benevolence	.40***	.01	.00	-.01	.26***	.23***	.41
Psychopathy	-.55***	.20***	.02	.04	.10	-.03	.23
Support for Redistribution	.19***	.51***	-.04	-.03	-.22***	-.14**	.57
Social Dominance Orientation	-.33***	-.36***	-.03	.14**	.17***	.12***	.47
SVS: Social Justice and equality	.43***	.31***	.02	.03	-.09	-.05	.41
SVS: Success	-.06	-.01	.17***	.13*	.11	.03	.13
Preference for Merit	.05	-.31***	.55***	-.04	-.01	.00	.42
Belief in a Just World	-.09**	-.10**	.05	.20***	.24***	.11**	.30
SVS: LNSFS	.16***	-.05	.13***	.28***	.32***	-.04	.44
Collectivism	.34***	.00	-.05	.31***	.27***	.03	.48
Group Loyalty	-.03	-.13***	-.02	.65***	.20***	.02	.70
SVS: TOSRA	-.05	.00	.01	.16***	.56***	.13**	.62
Right-Wing Authoritarianism	-.19***	-.16***	-.09***	.08*	.36***	.45***	.68
Left-Wing Authoritarianism	-.04	.56***	.04	-.09*	-.17**	-.01	.39
SVS: CDSS	.06*	-.05	-.05	-.02	.29***	.54***	.56
Disgust Sensitivity	.06	.02	.09*	.03	-.05	.24***	.07
Religiosity	.11***	-.13***	-.12***	.07	.06	.55***	.40
Political Ideology	-.19***	-.33***	.01	.06	.26***	.29***	0.55
Voting in elections	.07	-.06	-.08	.05	.03	-.15**	.02

Note. Cells containing a relationship expected to be significant are highlighted with a gray background. LNSFS: Loyalty, National Security, and Family Security Schwartz values. TOSRA: Tradition, Obedience, Social order, Respect and Authority from the Schwartz values. CDSS: Clean, Devout, Spiritual, and Self-discipline Schwartz values. The regression coefficients in the table are standardized. ***p < .001, **p < .01, *p < .05.

across this period.

10. Method

10.1. Participants

Participants from Study 1 were recontacted using Prolific Academic and invited to take part in a second study. The acceptance rate was 70.46 %, with a total of 570 participants completing the re-test online (281 females, age range 19–79 years, mean age 45 years, SD = 13.59). The study was approved by the Psychology Research Ethics Committee at the School of Philosophy, Psychology & Language Sciences at the University of Edinburgh. All participants gave informed consent.

10.2. Materials

Moral Foundations Questionnaire-2 (MFQ-2; Atari et al. (2023)). Participants completed the same version of MFQ-2 we used in Study 1, using the same online Qualtrics interface. Testing took approximately 5 min, and subjects received a small compensation.

11. Results

For each of the six MFQ-2 scales, scores were calculated for each participant as the sum of items forming each scale. We also calculated scores for country and community Loyalty (sub-factors identified in our own modelling above). This was done using the three items picked as indicators of these factors, as described in Study 1. The internal reliability of Study 3 data, as estimated by coefficient omega (See Table 7), was high for most of the foundations and comparable to the internal reliability in Study 1.

Test-retest reliability was assessed using intraclass correlation coefficients (ICC; Bartko, 1966) between the scores at times 1 and 2. Conventionally, ICC values less than 0.5 indicate poor reliability, values between 0.5 and 0.75 indicate moderate reliability, values between 0.75 and 0.9 indicate good reliability and values greater than 0.90 indicate excellent reliability (Koo & Li, 2016). The ICCs for the MFQ-2 scales are shown in Table 7. As seen, reliability for all scales was moderate to good according to the Koo and Li (2016) criteria.

12. Study 3 discussion

The purpose of Study 3 was to assess the reliability of MFQ-2 scores over an appreciable period of time (7 months). The results suggest that the ICC reliability approached the possible level of reliability, given the scales' internal reliability. The Care and Proportionality scales showed high omega-T reliability but reached moderate test-retest reliability, suggesting some room for improvement in these scales.

13. General discussion

The three studies reported here yielded several important findings.

Table 7
Seven-month test-retest reliability (ICC) for the MFQ-2.

Foundation	ICC	95 % CI	Omega total
Care	0.69	[0.65, 0.73]	0.91
Equality	0.76	[0.73, 0.79]	0.89
Proportionality	0.68	[0.65, 0.72]	0.81
Authority	0.84	[0.82, 0.86]	0.89
Purity	0.78	[0.76, 0.81]	0.77
Loyalty (total)	0.82	[0.79, 0.84]	0.85
Loyalty - country	0.84	[0.82, 0.86]	0.89
Loyalty - group	0.69	[0.65, 0.72]	0.70

Note. Omega total coefficients represent the reliability of moral foundations in the re-test data.

First, each of the six foundation scales of the MFQ-2 were validated individually using confirmatory structural modelling. In both Study 1 and 2, each scale conformed to the predicted unifactorial model, with the exception of the Loyalty foundation, which fit a two-factor (rather than one-factor) model. Second, we successfully modelled the entire questionnaire at the item-level using conventional structural modelling. This model demonstrated good fit according to accepted fit indices, supporting MFT as a whole by integrating all of the scales into a comprehensive latent factor model. Third, this well-fitting model was replicated in a second sample, supporting the replicability of the MFQ-2 structure across cultures (U.K. Study 1 and U.S. Study 2). Fourth, group factors of binding and individualizing were required for a good fit, supporting these as organizing principles on top of the individual moral foundations. Fifth, compatible with the univariate results, the Loyalty foundation was better represented as separate loyalty-to-nation and loyalty-to-group factors. Sixth, the MFQ-2 scales successfully predicted external validity measures, as employed by Atari et al. (2023). All but one external validation scale were supported. This was further bolstered by analyses using a more comprehensive linear modelling framework, enabling simultaneous tests of the effect of all MFQ-2 variables in the presence of each other. The exception to this suite of replicable external validation associations involved the LWA (Costello et al., 2022), which is negatively (rather than positively) associated with MFQ-2 Authority. Seventh, and finally, the scales showed good internal reliability and excellent test-retest reliability, as shown in Study 3. We discuss each of these findings in more detail below, concluding with some limitations and future directions for research on the MFQ-2.

13.1. Unidimensional results

In Study 1, we tested the uni-dimensionality of each foundation by fitting its items to a single-factor model. This was successful, as evidenced by satisfactory fit indices, except for the Loyalty foundation. Following the factor structure of the MFQ-1 (which required distinct factors for loyalty to one's group and loyalty to one's country (Zakharin & Bates, 2021)), we split the Loyalty foundation into Country Loyalty and Group Loyalty factors, each having three items. This two-factor model fit well, supporting the proposed split. In Study 2, we replicated this result in U.S. data, again showing that each of the six moral foundations is unidimensional except for Loyalty which required the proposed two-factor solution.

13.2. A well-fitting seven-factor model of MFQ-2

Study 1 confirmed the existence of the six foundations proposed for the MFQ-2 (with the nuance of a separate Country and Group Loyalty rather than a single Loyalty foundation). This model fit well at the item level and was replicated identically in an independent cross-cultural sample, providing strong support for the validity of the MFQ-2 structural model. As predicted by MFT, group factors were required in the form of individualizing (concern for individual persons), acting on Care, Equality and Group Loyalty foundations, and for binding, or group concerns, acting on Authority, Proportionality Purity, Group Loyalty, and Country Loyalty. The splitting of the Loyalty foundation into Loyalty to Country and Loyalty to Group fits within the welcoming approach of MFT with regards to additional foundations. It would be rewarding to explore how these divided Loyalty foundations relate to foundations that have already been proposed. That is, to relate our data-driven division to existing and novel theoretically motivated foundations, for instance Honour (Atari, Graham, & Dehghani, 2020) and Liberty (Iyer et al., 2012). This new model of the MFQ-2 has several implications for moral foundations theory and suggests additional directions for research. For instance, exploring the links between Proportionality foundation and related constructs such as mutualism (Baumard, Andre, & Sperber, 2013; Lin & Bates, 2022), research to understand the apparent substructure of Loyalty, as well as work on the genetic basis of these traits

(Zakharin & Bates, 2022).

13.3. The external validity of the MFQ-2 foundations

To test the external validity of moral foundations, we examined associations between the moral foundations and 18 external criteria (3 per foundation), closely following tests used by Atari et al. (2023). The results successfully replicated the findings reported by Atari et al. (2023), showing strong correlations between each moral foundation and the three external criteria with which it was expected to be associated (with one exception noted below). The external validity results provide strong evidence for the reliability of moral foundations. The significant correlations found between the moral foundations and external criteria, such as political attitudes, personality traits, and moral emotions, suggest that the six moral foundations of MFQ-2 are indeed fundamental and universal principles that shape individual moral beliefs and behaviours. The findings also suggest that moral foundations may be important in shaping political attitudes, as clear associations were found between the different foundations and political ideologies.

The sole deviation from our expected associations of MFQ foundations and external validity scales was an unexpected negative association between the Authority foundation and Left-Wing Authoritarianism. It is noteworthy that Atari et al. (2023) reported this association as not reaching significance in their data. Two other external validity criteria for Authority – RWA and a composite of the Tradition, Obedience, Social Order and Respect and Authority Schwartz values – *were* significantly associated with scores on the MFQ-2 Authority foundation –and these associations were substantial in size and in the predicted directions. Further research is required but viewed from the framework of MFT, LWA might best be viewed as an indicator not of authority (indeed, it may indicate low concern for authority) but rather of high concern for egalitarianism (as indicated by high association with MFQ Equality. This may suggest that the form of authoritative action or force associated with LWA differs from that associated with RWA and lies more in the "counter-dominance" motive to suppress inequality speculated by Boehm et al. (1993) and others to be associated with small ancestral group egalitarian morality.

13.4. Test-retest replicability of MFQ-2

Our final test of the new instrument was MFQ-2 test-retest reliability over seven months. We found that most foundations' test-retest reliability was high, indicating that people's moral foundations remained relatively stable over time. For Care and Proportionality, test-retest reliability was moderate (0.68 and 0.69, respectively). It is important to note that these foundations' somewhat lower test-retest reliability may not necessarily reflect a lack of stability in moral foundations themselves but rather the limitations of the specific test or measure used to assess them. Since our study was the first to assess MFQ-2 test-retest reliability, further research using more diverse samples would be valuable to assess the stability of moral foundations over time in a wider set of cultures.

13.5. Limitations and future directions

We should keep in mind the limitations of the study. The present study supported a model with a split Loyalty foundation with two subscales, each having just three instead of six items. Generating new items to capture the complete spectrum of group and country loyalty factors may be of value. A further limitation is that we cannot rule out that other moral foundations exist – for example, Liberty, proposed in MFQ-1. Seeking evidence that MFQ-2 is a comprehensive model of morality would be informative to the validity and generality of the broader moral foundations theory. The MFQ-2 predicted political values significantly better than it predicted the frequency of voting. This suggests the importance of including behavioural measures (such as voting) as external validators. It also suggests a direction for research: if both low and high scorers on each foundation are, for example, equally likely to translate this into voting activity, this might usefully delineate areas of behaviour in which moral foundation differences are important (political orientation) from those in which, despite being political in nature, foundational differences have less or no effect (voting frequency). The present studies were conducted across two different but still Western cultures. As shown by Atari et al. (2023), that the emergence of Binding and Individualizing hierarchical factors is primarily restricted to Western samples. Interestingly, work on the heritability of moral foundations, the most reliable genetic signal is not from any specific foundation, but to the higher-order individualizing and binding factors (Zakharin & Bates, 2021). This suggests possible differences in the organization of the foundations which might pre-dispose to WEIRD culture, which could be explored and contrasted with more culture-depended accounts. Therefore, international, cross-cultural replication of the model and further examination of the nature of the general relational factor are required.

13.6. Conclusion

Since its inception, MFT has become a central explanatory system for moral psychology. The goals of the MFQ-2 were to develop a measure which would permit reliable, valid, and more comprehensive measurement of the six moral foundations. The studies here confirm that it has achieved these goals, demonstrating both item-level fit for the foundations, reliable and stable scale measures, and good external validity. While confirming these core requisites in the MFQ-2, our modelling suggested that researchers could usefully explore the distinct associations of sub-national and national loyalty aspects of the Loyalty foundation. As nations, factions within nations, and coalitions of nations around the world appear in flux, and as moral intuitions are amplified and manipulated via new more powerful communications media, the MFQ-2 appears well-placed to aid understanding.

CRediT authorship contribution statement

Michael Zakharin: Conceptualization, Methodology, Investigation, Supervision, Data curation, Writing – original draft, Writing – review & editing, Formal analysis, Validation, Visualization, Software, Resources. **Timothy C. Bates:** Conceptualization, Methodology, Investigation, Supervision, Data curation, Writing – original draft, Writing – review & editing, Formal analysis, Validation, Visualization, Software, Resources.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

All data are open and available at OSF

Appendix

Regression analyses predicting each external criterion using seven moral foundations, with the Loyalty foundation separated into Loyalty to

Country and Loyalty to Group.

Criterion Variables	Care	Equality	Proportionality	Loyalty (Country)	Loyalty (Group)	Authority	Purity	R^2
Empathic Concern	.75***	-0.02	-.09**	.00	.05	-.03	.03	.54
SVS: Benevolence	.38***	.01	.00	.08*	-.10*	.27***	.23***	.42
Psychopathy	-.58***	.18***	.01	-.09	.13**	.11	-.02	.24
Support for Redistribution	.18***	.50***	-.04	-.10*	.06	-.21	-.13	.58
Social Dominance Orientation	-.32***	-.35***	-.03	.14**	.02	.16**	.11**	.47
SVS: Social Justice and equality	.42***	.30***	.02	-.05	.08*	-.08	-.04	.41
SVS: Success	-.11**	-.05	.15***	-.19***	.33***	.15*	.05	.18
Preference for Merit	.04	-.32***	.54***	-.09*	.04	-.01	.01	.42
Belief in a Just World	-.10**	-.11**	.05	.07	.15***	.25***	.11**	.30
SVS: LNSFS	.16***	-.05	.13***	.21***	.10**	.31***	-.05	.44
Collectivism	.32***	-.02	-.06	.08	.27***	.28***	.04	.49
Group Loyalty	-.00	-.10***	-.02	.55***	.18***	.18***	.01	.71
SVS: TOSRA	-.05	.00	.01	.08*	.10**	.56***	.13**	.62
Right-Wing Authoritarianism	-.17***	-.14***	-.08**	.17***	-.08**	.35***	.45***	.69
Left-Wing Authoritarianism	-.08*	.53***	.03	-.25***	.15***	-.14**	-.01	.42
SVS: CDSS	.05	-.06*	-.06	-.07	.04	.29***	.55***	.56
Disgust Sensitivity	.06	.02	.08*	-.02	.06	-.05	.23***	.08
Religiosity	.13***	-.11***	-.12***	.15***	-.07	.05	.55***	.41
Political Ideology	-.17***	-.31***	.02	.15***	-.08*	.24***	.28***	0.56
Voting in elections	.09*	-.05	-.08	.09	-.04	.02	-.15**	.02

Note. Cells containing a relationship expected to be significant are highlighted with a gray background. LNSFS: Loyalty, National Security, and Family Security Schwartz values. TOSRA: Tradition, Obedience, Social order, Respect and Authority from the Schwartz values. CDSS: Clean, Devout, Spiritual, and Self-discipline Schwartz values. The regression coefficients in the table are standardized. ***p < .001, **p < .01, *p < .05.

References

Akaike, H. (1983). Information measures and model selection. *International Statistical Institute, 44*, 277–291.

Altemeyer, B. (2007). *The authoritarians*. B. Altemeyer.

Asparouhov, T., & Muthén, B. (2014). Auxiliary variables in mixture modeling: Three-step approaches using Mplus. *Structural Equation Modeling: A Multidisciplinary Journal, 21*(3), 329–341. https://doi.org/10.1080/10705511.2014.915181

Atari, M., Graham, J., & Dehghani, M. (2020). Foundations of morality in Iran. *Evolution and Human Behavior, 41*(5), 367–384. https://doi.org/10.1016/j.evolhumbehav.2020.07.014

Atari, M., Haidt, J., Graham, J., Koleva, S., Stevens, S. T., & Dehghani, M. (2023). Morality beyond the weird: How the nomological network of morality varies across cultures. *Journal of Personality and Social Psychology*. https://doi.org/10.1037/pspp0000470

Bartko, J. J. (1966). The intraclass correlation coefficient as a measure of reliability. *Psychological Reports, 19*(1), 3–11. https://doi.org/10.2466/pr0.1966.19.1.3

Bates, T. C., Maes, H., & Neale, M. C. (2019). umx: Twin and path-based structural equation modeling in R. *Twin Research and Human Genetics, 22*(1), 27–41. https://doi.org/10.1017/thg.2019.2

Baumard, N., Andre, J. B., & Sperber, D. (2013). A mutualistic approach to morality: The evolution of fairness by partner choice. *Behavioral and Brain Sciences, 36*(1), 59–78. https://doi.org/10.1017/S0140525X11002202

Beer, A., & Watson, D. (2009). The Individual and Group Loyalty Scales (IGLS): Construction and preliminary validation. *Journal of Personality Assessment, 91*(3), 277–287. https://doi.org/10.1080/00223890902794341

Boehm, C., Barclay, H. B., Dentan, R. K., Dupre, M. C., Hill, J. D., Kent, S., … Otterbein, K. F. (1993). Egalitarian behavior and reverse dominance hierarchy [and comments and reply]. *Current Anthropology, 34*(3), 227–254. doi:0011-3204/93/3403-0001.

Brown, D. E. (2004). Human universals, human nature & human culture. *Daedalus, 133*(4), 47–54.

Conway, L. G., Houck, S. C., Gornick, L. J., & Repke, M. A. (2018). Finding the loch ness monster: Left-wing authoritarianism in the United States. *Political Psychology, 39*(5), 1049–1067. https://doi.org/10.1111/pops.12470

Conway, L. G., Zubrod, A., Chan, L., McFarland, J. D., & Van de Vliert, E. (2022). Is the myth of left-wing authoritarianism itself a myth? *Frontiers in Psychology, 13*, 1041391. https://doi.org/10.3389/fpsyg.2022.1041391

Costello, T. H., Bowes, S. M., Stevens, S. T., Waldman, I. D., Tasimi, A., & Lilienfeld, S. O. (2022). Clarifying the structure and nature of left-wing authoritarianism. *Journal of Personality and Social Psychology, 122*(1), 135–170. https://doi.org/10.1037/pspp0000341

Curry, O. S., Jones Chesters, M., & Van Lissa, C. J. (2019). Mapping morality with a compass: Testing the theory of 'morality-as-cooperation' with a new questionnaire. *Journal of Research in Personality, 78*, 106–124. https://doi.org/10.1016/j.jrp.2018.10.008

Dalbert, C. (1999). The world is more just for me than generally: About the personal belief in a just world Scale's validity. *Social Justice Research, 12*(2), 79–98. https://doi.org/10.1023/a:1022091609047

Davey, L. M., Bobocel, D. R., Son Hing, L. S., & Zanna, M. P. (1999). Preference for the merit principle scale: An individual difference measure of distributive justice preferences. *Social Justice Research, 12*(3), 223–240. https://doi.org/10.1023/a:1022148418210

Davis, M. H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology, 44*(1), 113–126. https://doi.org/10.1037/0022-3514.44.1.113

Fasce, A., & Avendaño, D. (2020). Opening the can of worms: A comprehensive examination of authoritarianism. *Personality and Individual Differences, 163*, Article 110057.

Fiske, A. P. (1992). The four elementary forms of sociality: Framework for a unified theory of social relations. *Psychological Review, 99*(4), 689–723. https://doi.org/10.1037/0033-295x.99.4.689

Franks, A. S., & Scherr, K. C. (2015). Using moral foundations to predict voting behavior: Regression models from the 2012 U.S. presidential election. *Analyses of Social Issues and Public Policy, 15*(1), 213–232. https://doi.org/10.1111/asap.12074

Graham, J., Haidt, J., Koleva, S., Motyl, M., Iyer, R., Wojcik, S. P., & Ditto, P. H. (2013). Moral foundations theory: The pragmatic validity of moral pluralism. In *, 47. Advances in experimental social psychology* (pp. 55–130). Academic Press. https://doi.org/10.1016/B978-0-12-407236-7.00002-4.

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*(5), 1029–1046. https://doi.org/10.1037/a0015141

Graham, J., Nosek, B. A., Haidt, J., Iyer, R., Koleva, S., & Ditto, P. H. (2011). Mapping the moral domain. *Journal of Personality and Social Psychology, 101*(2), 366–385. https://doi.org/10.1037/a0021847

Harper, C. A., & Rhodes, D. (2021). Reanalysing the factor structure of the moral foundations questionnaire. *The British Journal of Social Psychology*. https://doi.org/10.1111/bjso.12452

Hatemi, P. K., Crabtree, C., & Smith, K. B. (2019). Ideology justifies morality: Political beliefs predict moral foundations. *American Journal of Political Science, 63*(4), 788–806. https://doi.org/10.1111/ajps.12448

Ho, A. K., Sidanius, J., Kteily, N., Sheehy-Skeffington, J., Pratto, F., Henkel, K. E., … Stewart, A. L. (2015). The nature of social dominance orientation: Theorizing and measuring preferences for intergroup inequality using the new SDO(7) scale. *Journal of Personality and Social Psychology, 109*(6), 1003–1028. https://doi.org/10.1037/pspi0000033

Iurino, K., & Saucier, G. (2018). Testing measurement invariance of the moral foundations questionnaire across 27 countries. Assessment, 1073191118817916. doi:https://doi.org/10.1177/1073191118817916.

Iyer, R., Koleva, S., Graham, J., Ditto, P., & Haidt, J. (2012). Understanding libertarian morality: The psychological dispositions of self-identified libertarians. *PLoS One, 7*(8), Article e42366. https://doi.org/10.1371/journal.pone.0042366

Koenig, H. G., & Büssing, A. (2010). The Duke University Religion Index (DUREL): A five-item measure for use in epidemological studies. *Religions, 1*(1), 78–85. https://doi.org/10.3390/rel1010078

Koo, T. K., & Li, M. Y. (2016). A guideline of selecting and reporting intraclass correlation coefficients for reliability research. *Journal of Chiropractic Medicine, 15*(2), 155–163. https://doi.org/10.1016/j.jcm.2016.02.012

Levenson, M. R., Kiehl, K. A., & Fitzpatrick, C. M. (1995). Assessing psychopathic attributes in a noninstitutionalized population. *Journal of Personality and Social Psychology, 68*(1), 151–158. https://doi.org/10.1037/0022-3514.68.1.151

Lin, C.-A., & Bates, T. C. (2022). Free to choose: Mutualist motives for partner choice, proportional division, punishment, and help. *PLoS One, 17*(5), Article e0266735. https://doi.org/10.1371/journal.pone.0266735

Marsh, H. W., Morin, A. J., Parker, P. D., & Kaur, G. (2014). Exploratory structural equation modeling: An integration of the best features of exploratory and confirmatory factor analysis. *Annual Review of Clinical Psychology, 10*, 85–110. https://doi.org/10.1146/annurev-clinpsy-032813-153700

Matsusaka, J. G., & Palda, F. (1999). Voter turnout: How much can we explain? *Public Choice, 98*(3–4), 431–446.

Nilsson, A. (2022). Measurement invariance of moral foundations across population strata. *Journal of Personality Assessment, 1-11*. https://doi.org/10.1080/00223891.2022.2074853

Olatunji, B. O., Williams, N. L., Tolin, D. F., Abramowitz, J. S., Sawchuk, C. N., Lohr, J. M., & Elwood, L. S. (2007). The Disgust Scale: Item analysis, factor structure, and suggestions for refinement. *Psychological Assessment, 19*(3), 281–297. https://doi.org/10.1037/1040-3590.19.3.281

Petersen, M. B., Sznycer, D., Sell, A., Cosmides, L., & Tooby, J. (2013). The ancestral logic of politics: Upper-body strength regulates men's assertion of self-interest over economic redistribution. *Psychological Science, 24*(7), 1098–1103. https://doi.org/10.1177/0956797612466415

Peterson, J. C., Smith, K. B., & Hibbing, J. R. (2020). Do people really become more conservative as they age? *The Journal of Politics, 82*(2), 600–611.

R Development Core Team. (2021). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. *ISBN 3–900051–07-0*. In (Version 4.1.0) http://www.R-project.org.

Revelle, W. (2022). psych: Procedures for psychological, psychometric, and personality research. *In*. https://CRAN.R-project.org/package=psych.

Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. In Advances in experimental social psychology *Volume 25* (Vol. 25, pp. 1–65). Academic Press. doi:https://doi.org/10.1016/s0065-2601(08)60281-6.

Schwartz, S. H., & Bilsky, W. (1990). Toward a theory of the universal content and structure of values: Extensions and cross-cultural replications. *Journal of Personality and Social Psychology, 58*(5), 878–891. https://doi.org/10.1037/0022-3514.58.5.878

Shweder, R. A., Much, N. C., Mahapatra, M., & Park, L. (1997). The "big three" of morality (autonomy, community, divinity) and the "big three" explanations of suffering. *Morality and Health, 119*, 119–169.

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. https://doi.org/10.1111/ajps.12255

Stone, W. F. (1980). The myth of left-wing authoritarianism. *Political Psychology, 2*(3/4), 3–19.

Suhler, C. L., & Churchland, P. (2011). Can innate, modular "foundations" explain morality? Challenges for Haidt's moral foundations theory. Journal of Cognitive Neuroscience, 23(9), 2103-2116; discussion 2117-2122. doi:https://doi.org/10.1162/jocn.2011.21637.

Triandis, H. C., & Gelfand, M. J. (1998). Converging measurement of horizontal and vertical individualism and collectivism. *Journal of Personality and Social Psychology, 74*(1), 118.

Zakharin, M., & Bates, T. C. (2021). Remapping the foundations of morality: Well-fitting structural model of the Moral Foundations Questionnaire. *PLoS One, 16*(10), Article e0258910. https://doi.org/10.1371/journal.pone.0258910

Zakharin, M., & Bates, T. C. (2022). Testing heritability of moral foundations: Common pathway models support strong heritability for the five moral foundations. *European Journal of Personality*. https://doi.org/10.1177/08902070221103957