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Confirmatory Factor Analysis of the Moral Foundations Questionnaire

Independent Scale Validation in a New Zealand Sample

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Abstract. The Moral Foundations Questionnaire (MFQ) measures five universal moral foundations of Harm/care, Fairness/reciprocity, Ingroup/loyalty, Authority/respect, and Purity/sanctity. This study provided an independent test of the factor structure of the MFQ using Confirmatory Factor Analysis in a large New Zealand national probability sample ($N = 3,994$). We compared the five-factor model proposed by Moral Foundations Theory against alternative single-factor, two-factor, three-factor, and hierarchical (five foundations as nested in two second order factors) models of morality. The hypothesized five-factor model proposed by Moral Foundations Theory provided a reasonable fit. These findings indicate that the five-factor model of moral foundations holds in New Zealand, and provides the first independent test of the factor structure of the Moral Foundations Questionnaire.

Keywords: confirmatory factor analysis, scale validation, moral foundations, New Zealand

Moral Foundations Theory (MFT; Haidt & Graham, 2007; Haidt & Joseph, 2004) posits that there are five universal and innate moral foundations. These foundations have been labeled as Harm/care, Fairness/reciprocity, Ingroup/loyalty, Authority/respect, and Purity/sanctity (Haidt & Graham, 2007; Haidt & Joseph, 2004). Graham et al. (2011) empirically tested the validity of this five-factor structure against other conceptualizations of the moral domain and concluded that the five-factor model was the best fitting model. The present study aims to replicate the findings from Graham et al. (2011) in a large national probability sample of New Zealanders.

The present study uses confirmatory factor analysis to compare the five-factor model of morality from MFT with earlier models of morality including: Kohlberg's (1969) one factor model where justice is seen as the only mature universal moral system, and Shweder, Much, Mahapatra, and Park (1997) cross-culturally informed three moral languages of autonomy, community, and divinity.

Moral Foundations Theory is more closely related to Shweder et al.'s (1997) model in that the five factors take into account both individual and group protection-based morals. This differentiation between the individual-and-group based moral foundations are modeled in MFT through the conceptualisation of two higher-order factors known as the individualizing and binding foundations (Graham et al., 2011, 2013). The Harm/care and Fairness/reciprocity foundations are individualizing whereas

Ingroup/loyalty, Authority/respect, and Purity/sanctity are seen as binding because they relate to the evolutionary need to create functioning communities (Graham et al., 2013).

Based on the grouping of the foundations into individualizing and binding morals, the present study also tests a two-factor model (grouping individualizing and binding factors), and a hierarchical model whereby the five foundations are the first order factors and the individualizing and binding factors are second order foundations. While Graham et al. (2011) found both the five-factor MFT and the hierarchical models of morality were best fitting models, they concluded that the five-factor model was slightly better.

Graham, Haidt, and Nosek (2009) found that political liberals and conservatives differ in their endorsement of the binding and individualizing foundations with conservatives rating the binding factors as more relevant and important. The hierarchical model may therefore prove useful in explaining differences in the moral domain between ideological groups.

The present study replicates and extends the findings of Graham et al. (2011) in a nationally representative sample of New Zealanders. While Graham et al. (2011) used a large, global sample, they did not report any data from New Zealand (NZ), and the large majority of their sample came from the US, UK, Canada, and Western Europe.

Although NZ is considered a Western nation, there are key differences in the histories and politics of NZ and the

US, where most of the previous data came from. Whilst the US is largely a two-party democracy, NZ has a multiparty system which allows for a more diverse range of parties in the NZ political system, and one that is less divided along the liberal-conservative ideological lines than the more *culture war* (Hunter, 1991) prone system of the US. There is a large proportion of political moderates in NZ (Greaves, Osborne, & Sibley, 2014), and many of the issues scholars cite as indicative of a deep moral and cultural divide in the US such as attitudes toward abortion and gay marriage (e.g., Abramowitz, & Saunders, 2005; Hunter, 1991) are not as prominent or divided along ideological or party lines. For example, in 2013 NZ held a vote for The Marriage (Definition of Marriage) Bill which would legalize same-sex marriage. MPs did not vote along party lines on this issue and of the 59 MPs from the right-wing National Party, 27 voted for the bill. Taking into account these political differences is therefore important in generalizing Moral Foundations Theory beyond the domain of *culture wars* and the divide between liberals and conservatives (e.g., Koleva, Graham, Iyer, Ditto, & Haidt, 2012) wherein evidence for its empirical basis has previously been found.

The present study uses confirmatory factor analysis to compare a one-factor, two-factor, three-factor, five-factor, and a hierarchical model of morality in a NZ sample. It is hypothesized that the five-factor and hierarchical models based on MFT will provide the best fitting models. The three-factor model based on Shweder et al. (1997) three moral languages is expected to show a relatively good fit of the data. We also test a multigroup model of the five foundations by gender to see whether the obtained factor structure holds across genders (a test Graham et al., 2011 did not do). Further, we conduct a correlational analysis of the relationship between political ideology and the moral foundations. We expect the binding foundations to be positively related to political conservatism while the individualizing foundations are expected to show a small to moderate negative correlation with conservatism.

Method

Participants

We analyzed data from 3,994 participants who completed the 2012 online mid-year wave of the NZ Attitudes and Values (NZAVS). The NZAVS is a longitudinal national probability sample, although the mid-year data collected here was supplementary and completed only by participants who provided an email address in the full sample from the previous wave (roughly 60% of the initial sample size). Women were overrepresented in the sample (63.5%), with ages ranging from 14 to 92 years ($M = 49.15$, $SD = 15.72$). The majority of the sample identified as NZ European (90.6%) with Maori (4%), Pacific Nations (1.8%), and Asian (3.5%) also represented.

Measures

Participants completed the 30-item Moral Foundations Questionnaire (MFQ) which is split into two 15-item subscales measuring the five moral foundations (Graham et al., 2011).

The first subscale measures the relevance individuals ascribe to each of the foundations. This subscale includes 15 items on a 7-point response scale (anchored by 1 = *not at all relevant* and 7 = *extremely relevant*). An example item for this subscale is “whether or not some people were treated differently than others.”

The second subscale is made up of concrete moral judgement items where participants indicate on a 7-point scale whether they agree or disagree with a range of moral statements. An example item is “Chastity is an important and valuable virtue.”

Cronbach's α for the five subscales were:

- Harm/care ($\alpha = .65$);
- Fairness/reciprocity ($\alpha = .61$);
- Ingroup/loyalty ($\alpha = .71$);
- Authority/respect ($\alpha = .75$); and
- Purity/sanctity ($\alpha = .84$).

Results

Exploratory Factor Analysis

We first conducted an exploratory factor analysis of the MFQ. Factor analysis was performed using direct oblimin rotation with Kaiser normalization and maximum likelihood estimation. Scree plot and factor loadings showed a clear two-factor solution. These two factors correspond to the binding and individualizing moral foundations with all items loading on the expected factor. These findings parallel those obtained by Graham et al. (2011).

Confirmatory Factor Analysis

We tested five theoretical models for the full 30-item MFQ as well as separate model tests for the judgement and relevance subscales. In our model latent factors were allowed to correlate. Graphical representations of these models are provided in Graham et al. (2011). Model fit was assessed using the Chi-Square Model Fit index, the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI), the Akaike Information Criteria (AIC), and the Standardized Root Mean square Residual (SRMR). As the Chi-Square test of absolute model fit is sensitive to sample size, we used χ^2/df as an additional model fit index.

A RMSEA value below 0.06 is considered a good fit (Hu & Bentler, 1999; Steiger, 2007), while SRMR values

Table 1. Fit indices for alternative factor models of the Moral Foundations Questionnaire

	χ^2	<i>df</i>	χ^2/df	AIC	CFI	RMSEA	90% CI $\epsilon_a\Delta$	SRMR
Relevance items								
1. Five-factor model	973.70	80	12.17	196,200.16	.953	0.053	 [.050, .056]	.041
2. Hierarchical model	1,059.17	84	12.61	196,277.63	.949	0.054	[.051, .057]	.044
3. Three-factor model	1,462.83	87	16.81	196,675.28	.928	0.063	[.060, .066]	.046
4. Two-factor model	1,845.38	89	20.73	197,053.84	.908	0.070	[.068, .073]	.050
5. Single-factor model	5,949.63	90	66.11	201,156.09	.694	0.128	[.125, .130]	.108
Judgement items								
1. Five-factor model	1,181.98	80	14.77	213,944.00	.890	0.059	 [.056, .062]	.045
2. Hierarchical model	1,330.74	84	13.46	214,084.76	.875	0.061	[.058, .064]	.049
3. Three-factor model	1,418.32	87	16.30	214,166.34	.867	0.062	[.059, .065]	.051
4. Two-factor model	1,667.44	89	18.74	214,411.45	.842	0.067	[.064, .069]	.054
5. Single-factor model	2,763.74	90	30.71	215,505.76	.730	0.086	[.083, .089]	.069
Full MFQ (all items)								
1. Five-factor model	6,568.61	395	16.63	407,405.11	.829	0.063	 [.061, .064]	.065
2. Hierarchical model	6,760.31	399	16.94	409,588.81	.824	0.063	[.062, .065]	.066
3. Three-factor model	7,465.21	402	18.57	408,287.71	.804	0.066	[.065, .068]	.067
4. Two-factor model	8,612.58	404	21.32	409,431.08	.772	0.071	[.070, .073]	.069
5. Single-factor model	14,108.98	405	34.84	414,925.48	.620	0.092	[.091, .093]	.093
Multigroup Model - Gender								
1. Configural Model	6,921.02	790	8.76	–	.826	0.063	[.062, .064]	.065
2. Metric Model	6,956.63	815	8.54	–	.826	0.062	[.061, .063]	.066

Notes. AIC = Akaike information criteria; CFI = comparative fit index; RMSEA = root mean square error approximation; 90% CI $\epsilon_a\Delta$, confidence interval around RMSEA of the change in fit between models; SRMR = standardized root mean square residual. Preferred model printed in bold.

less than 0.08 are indicative of an acceptable fit (Hu & Bentler, 1999). The CFI is one of the most widely reported fit indices, with Hu and Bentler (1999) recognizing values equal to, or greater than, 0.95 on this index as a good fit.

Fit indices for alternative models are reported in Table 1. For the full MFQ, both the single morality factor model and the two-factor model showed poor fit of the data, while the three-factor, hierarchical, and five-factor models all showed acceptable fit. While the three-factor model showed acceptable fit of the data, the two models based on MFT provided better fit on all indices. The assertion from MFT that there are five separate and distinct moral foundations is therefore supported.

The five-factor model and the hierarchical model are indistinguishable across all fit indices. These results are consistent with our hypotheses and in general accord with previous findings (Graham et al., 2011).

As shown in Table 1, results of the separate judgement and relevance item subscale tests paralleled those of the full scale. Notably, the confirmatory factor analyses of the subscales showed a better overall fit of the data compared with the full scale.

Although the CFI for the best fitting models were well below the suggested acceptable fit index of 0.95 (Hu & Bentler, 1999), we prefer the RMSEA and SRMR as measures of model fit. The CFI estimates fit as a function of the extent to which the hypothesized model deviates from the data, relative to a “null model” in which the variables are uncorrelated. The correlations between item scores in the

MFQ tend to be fairly low (due to the complex nature of moral judgements), therefore the low CFI should not mean automatic rejection of the models.

Kenny (2014) argues that if the RMSEA of the null model is less than .158 then the CFI is essentially meaningless due to the low correlations between items. We computed the RMSEA scores of our null models (full 30-item MFQ RMSEA = 0.144, 90% CI = .143–.145; Judgement item RMSEA = 0.154, 90% CI = .152–.157; Relevance items = .214, 90% CI = .211–.216). As expected, the RMSEA of our null indicate that the CFI is not a good indicator of model fit.

Configural and Metric Invariance Models

We tested whether the five-factor model holds across gender. First, we tested whether the five-factor model provided good fit for both males and females separately. Results showed good model fit for both females ($\chi^2 = 4186.40$; $df = 395$; $\chi^2/df = 10.60$; RMSEA = 0.062, 90% CI = .061–.064; SRMR = .065; CFI = .824) and males ($\chi^2 = 2734.63$; $df = 395$; $\chi^2/df = 6.92$; RMSEA = 0.064, 90% CI = .062–.066; SRMR = .065; CFI = .828), indicating that the five-factor model of morality is supported in both groups.

We then tested a multigroup CFA to test whether the factor structure holds equal across the two groups. As evidenced by the fit statistics in Table 1, the configural

Table 2. Correlations of self-reported political ideology and the Moral Foundations

Measure	1	2	3	4	5	6
Full sample						
1. Political Conservatism	–					
2. Harm/care	–.05**	–				
3. Fairness/reciprocity	–.10**	.55**	–			
4. Ingroup/loyalty	.29**	.32**	.30**	–		
5. Authority/respect	.47**	.20**	.17**	.62**	–	
6. Purity/sanctity	.47**	.26**	.21**	.56**	.67**	–
Males only						
1. Political Conservatism	–					
2. Harm/care	–.01	–				
3. Fairness/reciprocity	–.03	.56**	–			
4. Ingroup/loyalty	.29**	.38**	.34**	–		
5. Authority/respect	.46**	.25**	.22**	.64**	–	
6. Purity/sanctity	.46**	.33**	.27**	.57**	.67**	–
Females only						
1. Political Conservatism	–					
2. Harm/care	–.04	–				
3. Fairness/reciprocity	–.13**	.54**	–			
4. Ingroup/loyalty	.28**	.33**	.28**	–		
5. Authority/respect	.47**	.21**	.15**	.61**	–	
6. Purity/sanctity	.49**	.23**	.18**	.54**	.67**	–

Note. **correlation is significant at the 0.01 level.

invariance model shows a good fit of the data indicating that the factorial structure of the five-factor Moral Foundations model is equal across gender groups.

After establishing configural invariance across genders, we then tested a stricter metric invariance model in which the factor loadings were constrained to be equal across groups (see Table 1). In comparing the metric model with the configural model, we can conclude that as the goodness of fit indicators do not significantly decrease, and thus metric invariance across gender is established.

Correlations of the Moral Foundations With Political Ideology

Finally, we performed correlational analysis on the mean moral foundation scores with self-identified political ideology as rated on a 7-point likert scale (1 = *extremely liberal* and 7 = *extremely conservative*). As shown in Table 2 the Purity/sanctity and the Authority/respect foundations showed strong positive relationships with political conservatism. Ingroup/loyalty showed a significant moderate positive correlation with conservatism. Although Harm/care and Fairness/reciprocity showed significant negative correlations with conservatism, these relationships were weak, indicating that these foundations are not related to ideology. The results for the binding factors are consistent with our hypothesis but the individualizing foundation results are surprising, and different to those found by Graham et al. (2011).

Table 2 also reports the correlations between political ideology and the five moral foundations separately by gender. The correlations do not appear to differ between genders.

Discussion

Findings from a CFA of the MFQ in a large NZ sample indicated that NZers exhibit the same five-factor structure of morality as the largely North American sample tested by Graham et al. (2011). The five-factors of morality articulated in MFT provided the best fit with the data compared to the other models tested.

As the hierarchical and five-factor models derived from MFT showed almost identical fit with the data, an argument could be made for the utility of both models. In some situations the five-factor model may be more useful for researchers, such as when they are interested in the predictive value of each of the factors in isolation. However, as proposed by MFT, these five-factors are empirically nested within the overarching individualizing and binding features. In some cases, such as in the study of morality and political ideology, the hierarchical model may be of greater utility, as it allows researchers to examine the links between these higher-order factors themselves with key outcome measures. Morality researchers therefore should consider the functionality and external validity of these two complementary models when deciding which to use as a framework in their own research.

Although Graham et al. (2011) tested the five-factor model separately in each world region, they did not do a multigroup analysis thus they are unable to be sure of the configural and measurement invariance of the model. Although our sample size did not allow for a multigroup model test across ethnic groups, we were able to test the five-factor model for gender and we found that males and females showed the same factor structure and factor loadings. Establishing metric invariance is important and allows for comparisons of obtained factor scores across groups: Thus future research should aim to test for equivalence across ethnic groups.

Perhaps the most interesting finding of our study was the asymmetric pattern of correlations with the foundations and political ideology. While the correlations with the binding foundations and ideology parallel those found by Graham et al. (2011), the individualizing foundations correlation patterns differ. In Table 11 of Graham et al. (2011) the average correlation between Harm and conservatism across the world regions was $-.20$ and Fairness was $-.32$. These correlations were even stronger in the US sample (Harm = $-.35$, Fairness = $-.44$).

A possible explanation for the divergent findings between Graham et al. (2011) and our sample is that the meaning of liberal and conservative may differ in NZ compared with the US. The terms liberal and conservative are not as salient in NZ, especially in describing one's political beliefs ("left-wing" and "right-wing" are far more common). This may result in NZers not identifying strongly with these labels, and they may also ascribe different meanings to these labels (see Wilson, 1999). Further, the reference, or middle point, of the liberal-conservative scale may meaningfully differ in NZ.

That is, it is quite possible that when asked to identify where one fits along a liberal-conservative scale, the referent point may be whether they favor the more left-wing parties, or the right-wing parties. The relative placing of the parties on these scales would most likely differ in a NZ context compared with in a US context. In fact, on many issues, the NZ right-wing National Party could be placed closer to the left-wing US Democratic Party, or even further to the left of it. When answering the ideology questions however, NZers are most likely referencing their place in relation to the NZ political spectrum, rather than in relation to where they would be on a US liberal-conservative scale.

A second possibility for the difference in the correlations could be the political histories of NZ and the countries sampled by Graham et al. (2011). This point is especially relevant in relation to the Fairness foundation: Prominent NZ political theorist Leslie Lipson (2011) argued that if NZ had the equivalent of the Statue of Liberty it would be a Statue of Equality. NZ, he argued, was founded on a tradition of equality and the importance its people place on equality and fairness could be seen as a national characteristic that transcends political ideology.

The present study replicated and extended the findings of Graham et al. (2011): It was found that the five-factor structure of morality holds in a NZ sample, although the strength of the relationship between politics, ideology,

and morality may not be as pronounced in NZ as in the US. Future research in NZ should therefore aim to understand why the correlations between ideology, and the individualizing moral foundations are not as pronounced in NZ as compared with the US and other Western nations.

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