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Summary

Decety *et al.* [1] examined the relationships between household religiosity and sociality in children sampled from six countries. We were keenly interested in Decety *et al.* [1]'s conclusions about a negative relationship between religiosity and generosity — measured with the Dictator Game — as our team has investigated related questions, often with potentially contrasting findings 2, 3, 4 and 5. We argue here that, after addressing peculiarities in their analyses, Decety *et al.* [1]'s data are consistent with a different interpretation.

Main Text

Given that previous studies (for example 6, 7 and 8) have shown cross-national variation in Dictator Game behavior, Decety *et al.* [1]'s approach of aiming to include country-level fixed effects in their analysis, to account for mean differences among countries, is sensible. But when they included their categorically-coded country (1 = US, 2 = Canada, and so on) in their models, it was entered not as fixed effects, with dummy variables for all of the countries except one, but as a continuous measure. This treats the variable as a measure of 'country-ness' (for example, Canada is twice as much a country as the US) instead of providing the fixed effects they explicitly intended. We have repeated Decety *et al.* [1]'s intended analysis by using actual fixed effects, along with their model specifications, and then explored other plausible specifications and modelling approaches. Our analyses reveal meaningfully different results from those originally reported.

Decety *et al.* [1] report that children from religious — especially Muslim — households recommend more punishment of a moral transgressor than do children from non-religious households. Using the same model specification as Decety *et al.* [1], but including dummy-codes for country (with USA as the referent), we find little support for this; no effect of household religious affiliation emerged (β = –0.03, $t(774)$ = –0.31, p =0.75). Because Decety *et al.* [1]'s ordinary least squares (OLS) regression analysis is not ideal for the highly negatively-skewed distribution of punishment ratings, we also estimated a model using the log of the reverse-scored punishment values; this similarly yielded no effect (β = 0.00, $t(774)$ = 0.14, p = 0.89).

Conducting Decety *et al.* [1]'s intended analysis also finds no support for their conclusion that more religious parents report their children having more empathy and sensitivity to injustices. When country is entered as fixed, Decety *et al.* [1]'s model specification reveals no relationship between religiosity and either empathy (β = 0.04, $t(764)$ = 1.15, p = 0.25) or justice ratings (β = –0.03, $t(767)$ = –0.57, p = 0.57; Table S1 in the Supplemental Information).

Decety *et al.* [1]'s primary claims concern children's altruistic behavior in the Dictator Game. Here again, our reanalysis using Decety *et al.* [1]'s intended specifications calls their conclusions into question. The fixed effects model shows no significant effect for religious affiliation on generosity

(OLS Model 2: $p = 0.70$; Table 1), though we do observe effects for age, country and (marginally) socio-economic status. However, Decety *et al.*[1]'s OLS model is poorly suited for the many zero offers in the data. To address this, we used a zero-inflated negative binomial regression, but still, no relationship with religious affiliation emerged. Indeed, within no single country was household religious affiliation a significant predictor of generosity (though sample sizes, and thus statistical power, are reduced; Table S2). Finally, given the overlap between country and religious affiliation, we also estimated a random effects model, which yields similar results (Table 1).

Table 1: Linear regression models showing the relationship between religious affiliation and dictator game generosity, with and without country-of-origin controls

	OLS Model 1	OLS Model 2	Random effects Model 3	Zero-inflated Negative Binomial Model 4	Zero-inflated Negative Binomial Model 5
	β(SE)	β(SE)	β(SE)	β(SE)	β(SE)
Religious (vs non)	-0.50 (0.17)**	-0.08 (0.21)	-0.13 (0.21)	-0.10 (0.04)*	0.00 (0.06)
Age	0.44 (0.03)***	0.42 (0.03)***	0.42 (0.03)***	0.08 (0.01)***	0.09 (0.01)***
Female	-0.21 (0.15)	-0.18 (0.14)	-0.17 (0.14)	-0.06 (0.04)	-0.07 (0.04)†
SES	0.21 (0.06)***	0.11 (0.07)†	0.12 (0.07)†	0.04 (0.02)*	0.03 (0.02)
Country (vs USA)					
Canada		0.29 (0.26)			0.05 (0.08)
South Africa		-1.46 (0.26)***			-0.31 (0.08)***
Turkey		-0.73 (0.24)**			-0.24 (0.07)***
China		-0.04 (0.34)			0.00 (0.08)
Jordan		0.07 (0.27)			-0.08 (0.07)
R^2	0.18**	0.25***	0.23***		

Models 1 and 4 show regression results without controlling for country-of-origin (either as a continuous or categorical variable). Models 2 and 5 control for country. Model 3 includes random intercepts for each country. The R^2 reported for Model 3 includes variance explained by both fixed and random factors [9, 10].

†$p < 0.10$, *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Though generosity appears unrelated to household religious affiliation, Decety et al. [1]'s dataset does reveal generosity to be negatively related to both household religious frequency (OLS: $\beta = -0.26$, t(789) = -2.38, p = 0.02; zero-inflated: $\beta = -0.07$, z = -2.13, p = 0.03), and intrinsic religiosity (OLS: $\beta = -0.19$, t(792) = -1.81, p = 0.07; zero-inflated: $\beta = -0.06$, z = -2.05, p = 0.04; country-by-country breakdown in Table S2). However, the effect is quite small: an increase in religiosity of 1 SD resulted in 6–7% lower odds of sharing stickers (roughly 0.2 fewer stickers); see also Table S2.

In sum, Decety et al. [1] have amassed a large and valuable dataset, but our reanalyses provide different interpretations of the authors' initial conclusions. Most of the associations they observed with religious affiliation appear to be artifacts of between-country differences, driven primarily by low levels of generosity in Turkey and South Africa. However, children from highly religious households do appear slightly less generous than those from moderately religious ones.

Acknowledgments

References

1. Decety, J., Cowell, J. M., Lee, K., Mahasneh, R., Malcolm-Smith, S., Selcuk, B., and Zhou, X. (2015). The negative association between religiousness and children's altruism across the world. Curr. Biol. *25*, 2951-2955.

2. Norenzayan, A., Shariff, A.F., Gervais, W. M., Willard, A.K., McNamara, R., Slingerland, E. and Henrich, J. (2016). The cultural evolution of prosocial religions. Behav. Brain Sci. *39,* 1-65.

3. Purzycki, B. G., Apicella, C., Atkinson, Q., Cohen, E., McNamara, R. A., Willard, A. K., Xygalatas, D. Norenzayan, A., and Henrich, J. (2016). Moralizing gods, supernatural punishment, and the expansion of human sociality. Nature *530*, 327-330.

4. Shariff, A.F., and Norenzayan, A. (2011). Mean gods make good people. Int. J. Psychol. Relig. *21,* 85–96.

5. Shariff, A. F., Willard, A. K., Andersen, T., and Norenzayan, A. (2016). Religious priming a meta-analysis with a focus on prosociality. Pers. Soc. Psychol. Rev. *20*, 27-48.

6. Henrich, J., Ensminger, J., McElreath, R., Barr, A., Barrett, C., Bolyanatz, A., ... and Lesorogol, C. (2010). Markets, religion, community size, and the evolution of fairness and punishment. Science *327*, 1480-1484.

7. House, B. R., Silk, J. B., Henrich, J., Barrett, H. C., Scelza, B. A., Boyette, A. H., Hewlett, B. S., McElreath, R., and Laurence, S. (2013). Ontogeny of prosocial behavior across diverse societies. Proc. Natl. Acad. Sci. U.S.A. *110*, 14586-14591.

8. Rochat, P., Dias, M. D., Liping, G., Broesch, T., Passos-Ferreira, C., Winning, A., and Berg, B. (2009). Fairness in distributive justice by 3-and 5-year-olds across seven cultures. J Cross Cult. Psy. *40*, 416-442.

9. Nakagawa, S. and Schielzeth, H. (2013). A general and simple method for obtaining R2 from generalized linear mixed-effects models. Meth Eco. Evo. 4, 133-142.

10. Johnson, P. C. D. (2014). Extension of Nakagawa & Schielzeth's R2GLMM to random slopes models. Meth Eco. Evo. 5, 944-946.