Dominance is necessary to explain human status hierarchies

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Durkee and colleagues (1) provide useful cross-cultural data on people's perceptions of the foundations of human status. However, a statistical error casts serious doubt on their conclusion that prestige is the primary or sole foundation of human status while dominance plays only a limited role.^{*}

Most notably, the predictor variables included in Durkee et al.'s critical analyses suffer from severe collinearity. Their models regress status (defined by terms like 'reputation') onto four predictors simultaneously: benefit-generation ability (BGA), benefit-generation willingness (BGW), cost-infliction ability (CIA), and cost-infliction willingness (CIW). As Figure 1 shows, several of these predictors are so strongly intercorrelated ($r \ge 0.80$) as to be largely redundant. Not only do these correlations exceed conventional cut-offs for diagnosing collinearity (r < 0.8) and produce variance inflation factors exceeding the 2.5 threshold believed to warrant concern (3.35 to 5.76), but our simulations confirm that they result in severely biased estimates, which vastly underestimate the impact of cost-infliction on status perceptions, by a factor of at least 4.*

[Insert Figure 1 here]

Fig. 1 | Relations among Durkee et al.'s predictors.

To address this collinearity problem in Durkee et al.'s models, we deployed two approaches. First, we combined the two *benefits* variables, and the two *costs* variables, into composites (i.e., aggregating BGA and BGW into one benefits variable, and CIA and CIW into one costs variable), which we then treated as separate predictors in new analyses. Second, we ran the same analysis but entered only one of the two predictors each for benefits and costs (i.e., only BGA or BGW, and only CIA or CIW). These approaches, which partially reduce collinearity, deliver a different result: *Both* cost-infliction and benefit-delivery contribute significantly to perceived status impact, though benefit-delivery remains more important (see Table 1).*

[Insert Table 1 here]

Table 1 | Perceived status impact is largely unrelated to cost-infliction when all four collinear predictors are included (columns 1 & 5), but is positively predicted by cost-infliction when collinearity is partially reduced using benefits and costs composites as predictors (columns 2 & 6) or when entering only one predictor each for benefits and costs (columns 3-4 & 7-8).*

Together, these reanalyses reveal that Durkee et al.'s conclusions are heavily driven by collinearity among the four nearly perfectly redundant predictors they used. Although both benefit-delivery and cost-infliction have strong positive relations with status projections, the importance of cost-infliction is concealed when both cost-infliction ability and cost-infliction willingness are simultaneously included as predictors, as they contribute largely the same information. Consequently, when we apply even a small correction for the problem of collinearity through model re-specification, Durkee et al.'s main conclusions are overturned, and both benefits and costs emerge as reliable and significant contributors to perceived status impact. Furthermore, this revised conclusion is consistent with other studies showing that both prestige (i.e., benefit-generation) and dominance (i.e., cost-infliction) are important contributors to status outcomes, and can have a similarly large impact (6–10).

In summary, the statistical error in Durkee et al.'s analyses prohibit drawing clear conclusions about the foundations of human status.

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^{*} For an extended version of this letter, data, and code, see: <u>https://github.com/joeytcheng/Dominance-Necessary-to-Explain-Status</u>



	Men as targets									Women as targets							
Predictor	All predictors (Durkee analysis)		Composites predictors		Ability predictors		Willingness predictors		All predictors (Durkee analysis)		Composites predictors		Ability predictors		Willingness predictors		
	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		
	Estimate (SE)	95% CI	Estimate (SE)	95% CI	Estimate (SE)	95% CI	Estimate (SE)	95% CI	Estimate (SE)	95% CI	Estimate (SE)	95% CI	Estimate (SE)	95% CI	Estimate (SE)	95% CI	
Benefit-generation ability (BGA)	0.38	0.29 - 0.48			0.74	0.69 - 0.79			0.6	0.51 - 0.69			0.78	0.71 - 0.85			
	(0.05)				(0.03)				(0.04)				(0.04)				
Benefit-generation willingness (BGW)	0.43	0.32 - 0.54					0.79	0.73 - 0.87	0.28	0.19 - 0.37					0.76	0.70 - 0.83	
	(0.05)						(0.03)		(0.04)						(0.03)		
Benefit-generation composite			0.78	0.72 - 0.84							0.87	0.80 - 0.93					
			(0.03)								(0.03)						
Cost-infliction ability (CIA)	0.11	0.03 - 0.19			0.26	0.21 - 0.32			0.06	-0.04 – 0.15			0.14	0.06 - 0.21			
	(0.04)				(0.03)				(0.05)				(0.04)				
Cost-infliction willingness (CIW)	0.06	-0.03 - 0.15					0.13	0.05 - 0.21	-0.01	-0.07 – 0.06					0.14	0.06 - 0.20	
	(0.05)						(0.04)		(0.03)						(0.03)		
Cost-infliction composite			0.18	0.11 - 0.24							0.04	-0.03 - 0.11					
			(0.03)								(0.03)						
Intercept	-0.01 (0.02)	-0.04 – 0.03	0 (0.02)	-0.04 – 0.03	-0.01 (0.02)	-0.05 – 0.04	-0.01 (0.02)	-0.05 - 0.04	0 (0.02)	-0.04 – 0.04	0 (0.02)	-0.04 - 0.04	0 (0.02)	-0.04 - 0.04	0 (0.03)	-0.05 – 0.05	
Observations	3069		3069		3069		3069		3069		3069		3069		3069		
Items	240		240		240		240		240		240		240		240		
Countries	14		14		14		14		14		14		14		14		
Marginal R ² / Conditional R ²	0.824 / 0.900		0.825 / 0.899		0.800 / 0.898		0.799 / 0.899		0.823 / 0.902		0.817 / 0.902		0.808 / 0.901		0.735 / 0.902		

Estimates shown are standardized population-level parameters (and standard errors in parentheses) from Bayesian multilevel models.

Bolded are 95% CIs that do not overlap with 0 (intercept term excluded).