● **LETTER**

Dominance is necessary to explain human status hierarchies

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Durkee et al. (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 (2).

Most notably, the predictor variables included in Durkee et al.'s (1) 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-inflication ability (CIA), and cost-inflication willingness (CIW). As Fig. 1 shows, several of these predictors are so strongly intercorrelated ($r \geq 0.80$) as to be largely redundant. Not only do these correlations exceed conventional cutoffs 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 inflication on status perceptions, by a factor of at least 4 (2).

To address this collinearity problem in Durkee et al.'s (1) 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 aggregating 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 inflication and benefit delivery contribute significantly to perceived status impact, although benefit delivery remains more important (Table 1) (2).

Together, these reanalyses reveal that Durkee et al.'s (1) conclusions are heavily driven by collinearity among the four nearly perfectly redundant predictors they use. Although both benefit delivery and cost inflication have strong positive relations with status projections, the importance of cost inflication is concealed when both cost-inflication ability and cost-inflication 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 respecification, 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 inflication) are important contributors to status outcomes, and can have a similarly large impact (3–7).

In summary, the statistical error in Durkee et al.'s (1) analyses prohibits drawing clear conclusions about the foundations of human status.*
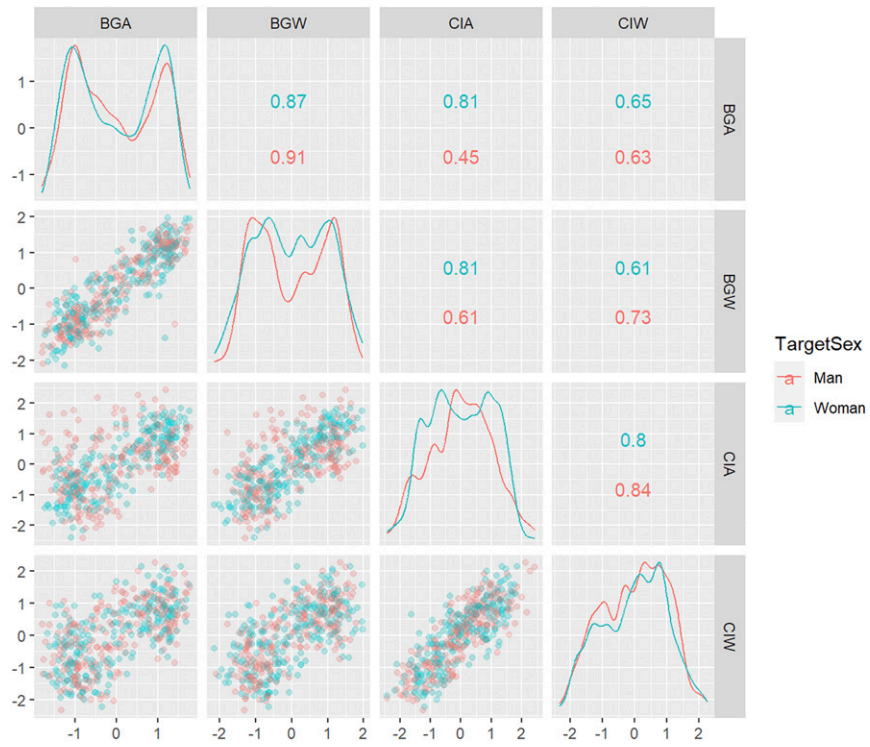
Fig. 1. Relations among Durkee et al.'s (1) predictors.

Table 1. Predictors of perceived status impact

	Estimate (SE) (95% CI)							
	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
BGA	0.38 (0.05) **[0.29, 0.48]**		0.74 (0.03) **[0.69, 0.79]**		0.6 (0.04) **[0.51, 0.69]**		0.78 (0.04) **[0.71, 0.85]**	
BGW	0.43 (0.05) **[0.32, 0.54]**			0.79 (0.03) **[0.73, 0.87]**	0.28 (0.04) **[0.19, 0.37]**			0.76 (0.03) **[0.70, 0.83]**
Benefit-generation composite		0.78 (0.03) **[0.72, 0.84]**				0.87 (0.03) **[0.80, 0.93]**		
CIA	0.11 (0.04) **[0.03, 0.19]**		0.26 (0.03) **[0.21, 0.32]**		0.06 (0.05) [−0.04, 0.15]		0.14 (0.04) **[0.06, 0.21]**	
CIW	0.06 (0.05) [−0.03, 0.15]			0.13 (0.04) **[0.05, 0.21]**	−0.01 (0.03) [−0.07, 0.06]			0.14 (0.03) **[0.06, 0.20]**
Cost-infliction composite		0.18 (0.03) **[0.11, 0.24]**				0.04 (0.03) [−0.03, 0.11]		
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	3,069	3,069	3,069	3,069	3,069	3,069	3,069	3,069
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

Perceived status impact is largely unrelated to cost infliction when all four collinear predictors are included (first and fifth columns), but is positively predicted by cost infliction when collinearity is partially reduced using benefits and costs composites as predictors (second and sixth columns) or when entering only one predictor each for benefits and costs (third and fourth columns and seventh and eighth columns) (2). Estimates shown are standardized population-level parameters (and SEs in parentheses) from Bayesian multilevel models. Boldfacing denotes 95% CIs that do not overlap with zero (intercept term excluded).

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