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LETTER TO THE EDITOR: Penrose Hypothesis not supported

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Dear Editor

Mundt et al. (1) should be applauded for attempting to bring new data to bear on a research question of substantive policy significance. We are concerned, however, that their analysis overlooked a point of critical significance. While they argued that their findings “cannot be explained by a simple overall trend to reduce numbers of beds and increase prison populations” (p.E6), they failed to adjust for secular changes in the underlying determinants of crime (3). Neither did Lamb (2), who argued in the accompanying editorial that longitudinal data are needed to appropriately test the Penrose Hypothesis, comment on the need to do so. Such adjustment would be considered standard practice in the analysis of panel data (4), particularly given the challenges of drawing causal inferences from cross-national panel data (5).

Using the information reported in Figures 1 and 2, we reconstructed the authors’ dataset (see Supplementary Materials). Fitting the same regression model with country fixed effects and robust standard errors, we replicated the authors’ main finding to a close approximation ($b=-5.11$; 95% CI, -6.61 to -3.60; $P<0.001$). Next, we added year fixed effects to the model. The estimated association between beds and prisoners was reduced in magnitude by more than 80%, was not statistically significant, and the lower confidence limit nearly excluded the upper confidence limit of the authors’ point estimate ($b = -1.09$; 95% CI, -3.37 to 1.19; $P=0.27$). Adding a linear time trend instead of year fixed effects yielded a similar result ($b=-1.02$; 95% CI, -3.49 to 1.46; $P=0.34$), suggesting that the weakened association cannot simply be attributed to the degree-of-freedom demands of the year fixed effects.

The correlation between beds and the linear time trend was relatively low (Spearman’s $\rho=-0.38$; 95% CI, -0.59 to -0.13), with the linear time trend explaining little of the variation in beds ($R\text{-squared}=0.23$). Thus, our finding cannot simply be attributed to collinearity

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between the two covariates. Consistent with this argument, Figure 1 in Mundt et al. (1) shows that the rates of change in beds differs for each country. Therefore, accounting for average sample time trends should not have attenuated the association between beds and prisoners if the association were (contrary to fact) robust. Even if our conclusion were simply driven by collinearity, it would not absolve the authors of their responsibility to adjust their estimates for secular trends (4).

The Penrose Hypothesis does not appear to be supported in these data.

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