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Neurosurgical Forum LETTERS TO THE EDITOR

Patient self-rated health and rating of their spine surgeon

TO THE EDITOR: Rabah et al.¹ reported results from a linear regression model to assess whether the Clinician and Group Consumer Assessment of Healthcare Providers and Systems (CG-CAHPS) global rating of provider item was associated with changes in the Patient-Reported Outcomes Measurement Information System (PROMIS) global physical and mental health scales (Rabah NM, Khan HA, Levin JM, et al. The association between patient rating of their spine surgeon and quality of postoperative outcome. *J Neurosurg Spine*. 2021;34[3]:449–455). These authors found no significant association between global provider ratings collected on average 277 days after lumbar spine surgery and change in PROMIS global health scores from baseline to 1 year after surgery (see Table 4¹).

These conclusions were based on a model in which changes in the PROMIS global scales were regressed on the global rating of the provider, controlling for baseline PROMIS scores and self-reported overall health and mental health items at follow-up. Adjusting for the baseline score when change is the dependent variable is equivalent to an ANCOVA model in which the dependent variable is a follow-up score rather than a change score. The sign of the coefficient for the baseline score will differ (negative in the change score and positive in the ANCOVA), but the coefficients for the other independent variables are the same.

The self-reported health items adjusted for, in which patients rated their overall health status and mental health status, make the results in Table 4 uninterpretable because these items overlap with the dependent variables. That is, these models adjust away meaningful variance in the dependent variables by including similar variables on both sides of the equation.

The paper also is also devoid of relevant CG-CAHPS^{2–4} and PROMIS citations.⁵

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Disclosures

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Response

We would like to thank Dr. Hays for his interest in our recent article, and we appreciate his insight. His contributions to the development of patient satisfaction and patient reported outcome instruments have played an important role in advancing patient-centered care.^{1,2} His main concern is that there may be collinearity between the self-reported health items included in our linear regression analysis and our dependent variables, specifically the Patient-Reported Outcomes Measurement Information System Global Health (PROMIS-GH) questionnaire Physical Health (PROMIS-GH-PH) and Mental Health (PROMIS-GH-MH) subscores. We agree with Dr. Hays that multicollinearity is an important consideration when designing multivariable linear regression models, as it may adjust away meaningful variance in the dependent variables.

In order to ensure that multicollinearity did not mask significant associations between our dependent and independent variables, we generated variation inflation factors (VIF) for each of the coefficients in our model (Table 1).³ These values indicate that there is low concern for collinearity between self-reported overall and mental health with our dependent variables and support the validity of our analysis.

For the sake of completeness, we also ran our initial

TABLE 1. Variance inflation factor for PROMIS-GH-PH and -MH scores

Variables	Tolerance (1/VIF)	VIF
ΔPROMIS-GH-PH score		
Physician encounter	0.95	1.05
Age	0.82	1.22
Disc displacement diagnosis	0.85	1.18
Overall health	0.67	1.50
Mental health	0.68	1.47
Preop PROMIS-GH-PH	0.80	1.25
ΔPROMIS-GH-MH score		
Physician encounter	0.95	1.06
Age	0.83	1.20
Disc displacement diagnosis	0.84	1.19
Overall health	0.70	1.42
Mental health	0.51	1.96
Preop PROMIS-GH-MH	0.61	1.63

multivariate models without self-reported overall and mental health as covariates. The findings obtained from our initial analysis persisted. Top-box patient satisfaction with spine surgeons was not a significant predictor of change in PROMIS-GH-PH (OR 2.57, 95% CI −0.07 to 5.22, $p = 0.06$) or PROMIS-GH-MH (OR 1.41, 95% CI −1.25 to 4.06, $p = 0.298$) scores.

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