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LETTER TO THE EDITOR

The Bayesian borderline regression method: Identifying pass marks for small cohorts

Dear Sir

The borderline regression method is commonly used in Objective Structured Clinical Examinations (OSCEs) to identify pass marks for OSCE stations. It is a simple linear regression with an independent variable (i.e. a global rating). Like other statistical procedures, some practical issues which surround the assumptions of regression analysis should be considered. One of these issues is the sample size. The required sample size for statistical significance is influenced by the alpha level, the desired power, the effect size and the number of predictors (in borderline regression there is only one predictor, the global rating).

It has been stated, as a rule-of-thumb, that students ≥104 for testing individual predictors is supported, if there is a medium-size correlation between global rating and checklist scores (Green 1991). So practically, medical schools with large main sit cohorts will have sufficient sample sizes to calculate the pass mark for OCSEs using the regression analysis. However, the sample size may not be sufficient for resit OSCEs, resulting in checklist scores becoming skewed, major measurement errors or a large estimated effect size. Such issues may result in a non-credible pass mark for resit OSCEs.

The Bayesian approach is becoming increasingly popular in psychosocial sciences (Kruschke 2011). It allows the incorporation of background (prior) knowledge to a regression model. Therefore, information from similar OSCE stations used on a large cohort of main sit students can be utilized in the regression analysis for smaller cohort resit examinations. This eliminates any anxiety regarding smaller sample sizes in resit examinations (Levy and Mislevy 2016).

Bayesian theory describes probability distribution when uncertainty exists about the parameters of interest (e.g. slope and intercept of the regression line). Therefore, to provide stable inferences of slope and intercept, we applied the Bayesian approach to set a cut score for a series of resit OSCE stations where the student cohort was small. To update prior knowledge by the current data (resit OSCE) in the form of the posterior distribution, we generated 20,000 samples from the distribution of the posterior of slope and intercept. Finally, we calculated a Bayesian estimation of the pass mark for the OSCE station. This technique, given the plots produced from 20,000 samples, increased our confidence regarding the pass mark produced for small cohort groups.

Disclosure statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this

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