Reviewer’s report

Title: External validation of two prediction models identifying employees at risk of high sickness absence: cohort study with 1-year follow-up

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Reviewer: Martin Slade

Reviewer’s report:

The manuscript describes a cohort study used in an external validation of two prediction models for identifying employees at risk of high sickness absence. The models were originally developed from a cohort of predominately female health care workers. The current study examines the predictive ability of the models in a population of office workers. The authors found that both models showed acceptable calibration but that only the episodes model showed acceptable discrimination.

The authors do a good job in defining their question and use appropriate methods with apparently sound data to answer their question. Overall, the paper is well written, though I discuss some issues below, and the limitations of the work are clearly stated. Having said all of this, I have one nagging question regarding the whole study. The authors state that it is desirable to not rely on questionnaire data to make determinations about the likelihood of a given employee having high sickness absence in the following year. The idea of relying only on data readily available in administrative datasets is a good one as questionnaires typically have only a moderate response rate thereby reducing the number of employees that can be evaluated for risk of high sickness absence. And, though it is true that the predictive model used in the manuscript includes age, prior sickness absence, and (added by the authors) gender, all of which are readily available from administrative datasets, it also includes self-rated health. This is something that I would expect to not be available in administrative datasets. Thus, employees have to be asked that question. If it is through a questionnaire, then all of the same problems of non-responses still apply. If, on the other hand, this data is expected to be gathered at either an on-site health fair or from employee visits to the company’s medical department, I suspect that many would still not be represented. I understand that the authors are validating a previously defined model, but it would be interesting to understand the loss of predictive power if self-rated health was not part of the equation. As the authors did add gender to the original model to determine its effect, the idea of tweaking the predictive model seems within the scope of the paper.

Discretionary Revisions:

1. The authors state that “In daily occupational health care practice, however, employees can be asked to rate their health. Thus, SRH is a variable that is easy
to obtain without the need for health surveys or check-ups”. I am skeptical about this claim. How often do employees go to the health care practice? Do some employees never go there? I would like to understand the true ability to get data on all employees.

Minor Essential Revisions:
1. The discussion of the previous development setting should be moved from the methods section to the background section.
2. Episode should be explicitly defined.
3. There are two typos:
   a. Page 7, top line: ..absence from work due [to] work-related...
   b. Page 11, 3rd line of 2nd paragraph: were should be where.
4. Table 1: I don’t understand why, under prior sickness absence, the N(%) days has 120 employees with 0 days absent, but the N(%) episodes has 123 employees without an episode. These should be the same value.
5. Table 1: There are 593 employees in the study, but adding up the number of people in the N(%) days section, it only sums to 590.
6. Table 3: Under the SA episodes model, Self-rated health, I believe values of standard errors for Re-estimation and Gender inclusive models are incorrect. The first appears to be missing the decimal. The second just seems incorrect as it is about 4x the standard error in the other 3 models.
7. Table 3: Under SA episodes model, Gender, the standard error for the Gender inclusive model is incorrect.

Major Compulsory Revisions:
1. The authors state that a total of 633 office workers participated in the health check-ups and of these only 6% were unable to be included in the analysis. The concern I have has to do with not knowing the size of the company’s workforce. What percent of office workers is represented by the 633 office workers that showed up for the health check-ups and are they different from the employees that did not show up?

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** Yes, and I have assessed the statistics in my report.

**Declaration of competing interests:**
I declare that I have no competing interests