Reviewer’s report

Title: Developing and Evaluating an Instrument to Measure Recovery After INtensive care: The RAIN instrument

Version: 0 Date: 16 Oct 2017

Reviewer: Theodore Cosco

Reviewer's report:

The authors have constructed and evaluated the reliability and validity of a scale used to capture recovery after intensive care. There is a clear articulation of the need for this scale which frames the manuscript in a way that demonstrated the value of developing the RAIN. There are, however, some fairly major methodological issues and omissions from the text that detract from this important work. There is no mention of who exactly was included in the study, so it is hard to know how generalisable this scale is and to whom. Omitting information on demographic characteristics of the sample group and the pattern of missingness is also an issue, inhibiting the interpretation of the findings. The scale itself faces challenges with respect to floor and ceiling effects, that are not adequately discussed. Given the limitations the authors identify in the results section, the discussion of these shortcomings does not provide a convincing case for why this scale should see further usage.

Introduction.

1. Many constructs are introduced, notably recovery and health; however, the operationalisation of these constructs within the framework of this study is unclear. Particularly in the development of a psychometric, having a transparent theoretical framework is key. This omission is exacerbated by the opacity of the mechanisms used to construct the scale. It is unclear as to how the scale items were developed and chosen, and by whom.

2. What is "normal general health"? The following sentence suggest that this state can exist despite the presence of pain, sleep disturbances, depression, etc. so I am curious as to how this "general health" is defined.

3. It is unclear as to how the items were actually derived and the content validity assessed. The text would indicate that a group of experts, i.e. the authors, developed the items based on the literature. It is unclear as to who the experts assessing the content validity were, e.g. were the authors included amongst this group? Further, against what criteria were these experts evaluating these components. It appears that the authors have (admirably) gone to great lengths to assess the content validity of the RAIN; however, the articulation of this assessment and of the construction of the scale is somewhat obfuscated in the text. A more
transparent revision of this text would benefit the reader as well as better highlight this importance of this validation process.

Methods

4. There is no mention of how many patients were contacted and how many actually completed the questionnaire. What was the response rate?

5. The use of the Guttman-Kaiser criterion, i.e. extracting factors based on having an Eigenvalue of greater than zero, has been criticized heavily in the literature. For example, by M.F. Steger, An illustration of issues in factor extraction and identification of dimensionality in psychological assessment data, J Pers Assess 86(3) (2006) 263-72. I would be hesitant to use only Eigenvalues as the only factor extraction methods given the availability of alternative and complementary methods, e.g. scree plots. If the authors choose to use only Eigenvalues, a persuasive argument for this choice would be required to augment the existing text.

6. Readers may be unfamiliar with the Content Validity Index, of which there is no reference attached nor a description of what this entails. A further articulation of how the CVI was used in the context of this study and what it measures would be prudent.

Results

7. No information is presented on the demographic/socioeconomic characteristics of the sample. This omission raises questions about the generalisability of these findings; therefore, it would be prudent to include a table that includes these characteristics.

8. Missing data are not reported. The authors note that the proportion of incomplete values ranged from 0-4.3%, but the actual number of surveys that had missing data are not reported. Further, the degree to which imputation was required is not presented. This could reveal important issues with item non-response, e.g. if respondents are consistently missing a question and these values are imputed. This should be articulated further, for example in a table reporting missingness for each question.

9. There are considerable floor and ceiling effects that raise serious questions about how useful this scale will be. A convincing case for why this scale should be used in the presence of these detrimental attributes is required. Further, given that no details are provided about the demographic or health profile of the sample is not provides, so the reader has no insight into what may be driving these relationships.
Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

No

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Unable to assess

Are the conclusions drawn adequately supported by the data shown?
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No

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