Reviewer’s report

Title: A Standard Procedure for Creating a Frailty Index in a Cohort Study

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Reviewer: Alexander Kulminski

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This is well-written manuscript complying with all standards of the journal.

During recent years Rockwood and Mitnitski and colleagues have been pursuing their research of the frailty index. The results of their studies are very intriguing in explaining increased vulnerability of the elderly individuals to many adverse outcomes including death, hospitalization, and poor health. Most interestingly is that those associations have been observed using measurements which are readily available in majority of studies of health and aging of the elderly individuals. The problem, however, was that the method of construction of the frailty index was not systematically described. In this paper the authors present step-by-step procedures for operationalization of the frailty index using a typical study of the elderly individuals. This is a very valuable contribution and publishing this paper in an open access journal would provide a possibility to many researchers to have access to this knowledge.

I have only minor discretionary comments on the paper.

The authors understand that there is a problem with definition of cut-points for continuous variables. The authors suggested an elegant method for selecting these cut-points by conditioning continuous indices on an interim frailty index. Although such a method looks informative, the authors may wish also to briefly mention other possible approaches as long as they wish to tabulate the process of construction of the frailty index. For instance, typical practice in many studies is to define cut-points on the basis of percentiles in the frequency distributions of the respective traits. Another approach is based on categorization of the selected continuous traits according to risks of a certain hazard (e.g., death).

In general, there is also a problem with definition of such cut-points because the effects of many continuous traits are age-specific. Than, one can, for instance, define these cut-points at certain age intervals. The authors may wish to briefly mention this as well as the fact that even for many well-established physiological indices (e.g., cholesterol, blood pressure) there are no definitive age-specific procedures for selecting cut points, i.e., “normal” values of these indices. This, in particular, motivated studies of age-dependent physiological norms using more effective approaches (e.g., (Yashin et al., 2007))

It would be helpful the authors define mortality more precisely. Currently, it is unclear how (for each of the two waves of the survey or not) and why (limited by the follow up?) the 5-year mortality was assessed?
I would suggest clarifying a bit the paragraph starting with “In investigating the upper limits to the frailty index…”. Presumably the authors mean the case when they have considered the 99% sample.

When the authors discuss predictive validity of the frailty index in Discussion, I do not understand why they did not refer the studies comparing predictive power of the CHS-based definition of frailty and the frailty-index-based definition performed by their group and by others (Kulminski et al., 2008).


**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

'I declare that I have no competing interests.