Reviewer's report

Title: Validation of exposure assessment for a prospective cohort study of mobile phone users (COSMOS) in Finland

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Reviewer: Martha Linet

Reviewer's report:

The manuscript entitled "Validation of exposure assessment for a prospective cohort study of mobile phone users (COSMOS) in Finland" provides useful new information, but major revisions are needed to clarify the objectives of this pilot study and more clearly explain the different components and phases. In addition, the authors should underscore the novel contribution(s) of this study, briefly describe the methods for the planned cohort investigation that will follow this pilot study, and explain what will be done with the results of this pilot study.

The title of the manuscript suggests that the focus is on validation of exposure assessment, but several other important methodologic components are described that were evaluated by assessing participation. The authors should revise the title to reflect the additional components (something like "Validation of exposure assessment and assessment of methods to improve participation in a planned prospective study of mobile phone users (COSMOS) in Finland"). The Abstract should reflect more accurately the nature of the pilot study with: a more precise statement of the study objectives; a clearer statement of the approach (e.g. targeted population, data sources and methods for data collection, methods of analysis); a reorganization of the Results starting with the overall response rate, followed by the availability of operator data, then the results of the exposure assessment, then the other study results; and Conclusions that do not replicate the results but focus on the several implications of the results for the planned cohort study.

The Background should be shorter and more focused on the RELEVANT background. One needs to understand why this pilot study was carried out. The authors should briefly describe the planned methods for the proposed cohort study so the goals of the pilot study are more clear. From the Background as is, it was not clear how the new cohort study will overcome the limitations of case-control studies (since the plan is to use questionnaires with self-report), other than the idea that the cohort study will also utilize operator records (which have their own limitations). The Background should provide information about what is novel about the pilot study.

The Methods would be clearer if the authors provide a flow chart to show the two major different components, and the two approaches within the second component along with participation rates. The rationale for obtaining additional operator data for 2008 and 2009 was not explained.
The Results should be completely quantitative. For example in the first paragraph in the section on Validation, the authors should describe reasons for not receiving mobile phone data for 17% of the subjects from the operators. The authors state "The amount of mobile phone use differed slightly between the period preceding the start of the study and the first monitoring period." What was the length of the interval between the start of the study and the first monitoring period? What do the authors mean by 'differed slightly'? In the second paragraph in the Validation section, it was not clear why the authors collected mobile phone data for successive years.

The Discussion needs substantial revision. Paragraph one should also summarize the participation rates overall and by method of data collection. Paragraph two should eliminate the description of non-differential random errors, since it is not relevant. What the authors found is systematic bias. Paragraph three ends with a comment about the uncertainties inherent in retrospective exposure assessment based on interviews. However, the self-report planned for the cohort study will have the same inherent problems, particularly for those subjects for whom operator records cannot be obtained. Paragraph five states that "for the full study, however, data will be obtained for a three-month period each year". This critically important statement is buried in the Discussion, but should have been described in the Background section of the manuscript so the reader could understand more about the ultimate validation approach for the proposed cohort study. Interpretation of the pilot study validation is substantially affected by knowing that the cohort study data collection will involve only 3 months of operator records. The authors acknowledge that phone use varies within and over time. Limitations of the Results of the pilot study are not described. In addition, the last paragraph seems to gloss over the very low participation rate and the implications for the planned cohort study. A more measured conclusion would be appropriate.

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

**Quality of written English:** Needs some language corrections before being published

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

**Declaration of competing interests:**

I declare that I have no competing interests.