Reviewer's report

Title: Re-inventing the wheel: a new method for characterising and designing behaviour change interventions

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Reviewer: Russell Glasgow

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This is an important and engaging, thoughtful article presenting a new integrative model of behavior change. The paper has numerous strengths including: a focus on context and the multi-level nature of behavior change interventions, a very useful summary figure that nicely represents key foci, a comprehensive framework that is both intuitive and incorporates both policy and direct delivery of services, an apparently reliable coding scheme to operationalize the model or framework, and a couple excellent examples of application of the ‘wheel’ model.

The article could be strengthened and its communication value enhanced by attention to the following issues:

Important/Major:

1. It is not clear out of all the possible criteria these three were selected to both evaluate existing models, and to use for judging the utility of this new model. These seem to ‘make sense’ but they seem a bit arbitrary…. And frankly sounds more like they were post hoc criticisms of existing models rather than following from any given framework or meta-position. (This would be fine if this was the case, but I just had a hard time understanding were these 3 criteria- and not others came from). Why not include parsimony, ability to explain outcomes that other frameworks are not, usefulness for generating new, context-sensitive interventions, ability to predict effectiveness of intervention, etc.?

Relatedly, the second criteria of ‘coherence’ seems to be ‘in the eye of the beholder’ or raters. It is not clear why interventions cannot be of different levels of specificity ? I wonder if others who do not share the authors’ perspectives- or level of understanding of the field would make similar
ratings or judgments about coherence.

2. The usefulness of the model would be much greater if it could be used to make some a priori predictions, in addition to just classifying interventions. For example, would the model predict that using components from all three ‘levels’ of the ‘wheel would be more effective; or more sustainable than those with fewer?

a. It would seem that some criterion of the level to which intervention are context sensitive; or adapt to context over time, and how these components are integrated, or how evidence-based they in fact are would enhance the usefulness of the system.

b. The various categories and levels vary greatly in their breadth- and in their cost- from a public health perspective, this is very important, but it is not clear how or if the new model addresses these issues.

3. The introduction to the article- prior to stating the purpose on page 8 is too long, and seems – without the context of purpose to be a long trashing of alternative and existing approaches- but without a systematic context, or understanding of why or how the authors are being so critical of these other models. This section could be considerably condensed and re-organized so that some of it included in the review of existing frameworks.

More Minor issues; Clarifications needed:

1. Agreement or reliability should be assessed by a more rigorous method than percent agreement, such as kappa or other indices that correct for capitalization on chance and base rates.

2. It is unclear the basis on which the authors excluded over 99% f the potentially relevant articles they located.

3. Pg. 9- The reference to U.S. criminal law seems strange- in general the law and behavioral science are two quite different systems, use vastly different criteria, approaches to evidence, etc. I am not sure that appeal to three criteria that appear- on the surface- to be similar- add much to the argument.

4. If intervention mapping is included, it is unclear why related paradigms or frameworks such as PRECEDE-PROCEED were not also included.

**Level of interest:** An article of outstanding merit and interest 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 interest