Reviewer's report

Title: From intervention to interventional system: Towards greater theorization in population health intervention research

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Reviewer: Alan Shiell

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This is a thoughtful reflection on the impact of complexity on population health intervention research. The authors draw two conclusions. First, there is a need for greater theorisation in the design of interventions (and I would add also in their implementation and evaluation) and second, there is a need for greater 'hybridisation' in research - which I take to mean both greater inter (trans) disciplinary work and greater emphasis to be given to the insights from practice and from service users.

I have no issue with either point though only the first and the first part of the second is argued thoroughly in the manuscript. The call for greater involvement of practice and end-users appears more as a last minute add on, but is worthy of being unpicked and discussed further if the authors have the interest. The role of practice is especially important in exploring and surfacing the mechanisms by which interventions are enabled (through local adaptation perhaps) to exert their impact on the outcomes of interest, and so I would welcome more discussion of this - e.g., why and how it happens, how it can be helped to happen better, and what are the implications for research and evaluation methods.

Two minor issues I'd like to point out.

First, the discussion of Penny Hawe's work (ref 8) appears to suggest that her contribution to this debate was not systemic ... as the next sentence suggests that 'Others take a more systemic approach ... '. However the 'others' that are referenced subsequently include Hawe as one of the co-authors, and the seminal 'events in systems' paper was first authored by her (Hawe P, Shiell A, Riley T. Theorising interventions as events in systems. Am J Community Psychol 2009; 43: 267 - 276.). The 'events' paper was among the first to redefine interventions in terms of the systems in which they were implemented.

Second, the discussion of the role of trials in the face of complexity is a little ambiguous. Some authors reject outright the use of trials in the face of complexity. Others claim there continues to be a role for trials, albeit a circumvented one. I sit firmly in the latter camp, and it is not clear where in this debate the authors stand, yet I believe this is an important aspect of the need for greater theory and hybridisation to improve intervention design, implementation and evaluation.
Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

Yes

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