Author’s response to reviews

Title: Using a Theory-Driven Creative Process to Design a Peri-Urban On-Site Sanitation Quality Improvement Intervention

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Responses are included in an attached file using colored text/highlighting to make the reading easier, but are provided below as well:

Dear Dr Tidwell,

Your manuscript "Using a Theory-Driven Creative Process to Design a Peri-Urban On-Site Sanitation Quality Improvement Intervention" (PUBH-D-18-01947R1) has been assessed by our reviewers. They have raised a number of points which we believe would improve the manuscript and may allow a revised version to be published in BMC Public Health.

Reviewer reports:

Juliet Willetts (Reviewer 2): Many thanks for the opportunity to review this publication a second time. And thank you to the authors for fully considering the range of comments and making changes which have helped strengthen the paper.

I find that the majority of detailed comments have been dealt with. However, there are still some issues that I feel have not been convincingly resolved. The abstract in particular I find not to have been sufficiently adjusted in line with the changes to the paper, and to still contain a
conclusion that is future-focused rather than making clear the contribution of this paper. This comes back to the remaining issue that there is still not really a clear methodology and analytical framework. The authors have shifted around content in response to my and the other reviewer comments (which concurred on criticising the paper for lack of methodology) but have not really addressed the fundamental concerns raised. I therefore have not been able to agree that the methods are appropriate and well described, nor that the conclusions are adequately supported by the data. I hope that the comments below can help clarify ways to address both of these remaining concerns. I have suggested 'major revisions' still, since the comments below are more than minor tweaks. However I see the changes required as lying somewhere between major and minor, and certainly less than was expected from the previous review.

Below are my remaining issues and changes I consider essential before publication:

- Revise the abstract to a greater extent and make clearer the purpose of the paper. The background section does not currently clarify that purpose, and this is a major gap.

Added to the background section of the abstract:

We describe the development of a behavior change intervention to improve on-site peri-urban sanitation quality in Lusaka, Zambia using the Behavior Centered Design (BCD) framework to explain the results of the process applied to improving the quality of shared peri-urban sanitation and compare them to similar interventions.

Lines 88-90 of the paper start to do this, but still don't fully clarify this paper’s exact purpose.

We have expanded the paragraph referenced above as follows:

This paper documents the theory-driven design process of creating an intervention to be evaluated in the future to produce such evidence for Lusaka, Zambia, with the potential to inform programming in other settings. About 70% of the 2 million residents of Lusaka, Zambia live in peri-urban areas [13]. Residents live on plots, either in landlord or tenant households, and typically share a pit latrine located on the plot. A description of the results of this process clarify how an intervention to improve shared peri-urban sanitation quality facilitated the advancement of empirical knowledge about the target behaviors as well as applied behavioral science in general.

There is overlap in the method and results narrative- please separate and clarify these.
At present, the methods describe the process used for the Assess phase, the process used for formative research, the process used in the Create step including a creative workshop, the development of a creative brief, design specifications for the creative agency, and the process used to design the intervention.

The results present the results of the Assess phase, a summary of the Build phase (reported in another paper), and then describe the results of the design process in detail, followed by a detailed description of the final product, the intervention, described in reference to the behavioral theories it is based upon.

We think this is the appropriate division.

The results do not really speak of how the 'theory driven' approach offered value (against other approaches), and yet my understanding from the author narrative is that that is central to how the authors view the contribution of this paper.

The results present the outcome of the theory-driven intervention design process. The discussion covers how this might compare to other processes, because such comparisons (in terms of the superiority of the intervention developed) can only be speculative. However, the results cover in detail the use of behavioral theory and how it might be assessed by evaluating the intervention due to the theory-driven development process used.

The conclusion should not be referring forward "will advance applied behavioural science" "this will allow for …" but stay focused on the contribution already made in this paper, and not use future tense. That is, in what ways does this paper contribute to applied behavioural science that can be claimed now (not in the future)?

We have edited the conclusion as follows:

Using the BCD framework provided an easy-to-follow intervention design process. The resulting intervention is highly creative and multi-faceted, with each element having a theoretical role in an explicit theory of change. The development of this theory-driven intervention advances applied behavioral science by facilitating evaluation of each of the behavior change techniques and the overall delivery mechanism hypothesized to change the target behaviors. This informs the adaptation of these findings to improving on-site sanitation in other settings and the iterative development of the BCD model, which can be used to more effectively change other behaviors.
- Make clearer in the paper the way in which 'each aspect of the underlying theory corresponded to an intervention element, the evaluation of which can contribute to empirical and theoretical knowledge.’ As at present the results still read as descriptive rather than analytical.

We have clarified the role of the new social environment by adding the following description:

The opportunity for social reward, learning, and reinforcement was identified as a key behavior change mechanism, corresponding to surprise and revaluation in the BCD theory of change.

We also amended the text describing the behavioral performance facilitation cards and their application to creating surprise and revaluation through landlord-tenant interaction:

These cards also demonstrated the final purpose of the intervention structure—encouraging increased interaction between landlords and tenants to reveal unexpressed demand (again, surprise and revaluation).

The paragraph in-between describes the performance aspect of the theory of change for the general intervention delivery mechanism.

The three following paragraphs explicitly describe (by name) the intra-meeting components corresponding to surprise, revaluation, and performance.

In these ways, the intervention delivery mechanisms and lessons-specific content corresponded to the BCD theory of change, and are now each described by name in the opening sentence of each paragraph.

On the issue of ethics in relation to landlords and supporting their interests for greater rental income, suggest that this issue, even if not speculated upon, should be mentioned somewhere in the paper, even if it is to express the concern the authors also felt in this regards, and any relevant literature (the authors mention recent Barrington paper).

We have added the following paragraph to the Design Process section of the Results:

Some concern was also raised among the team about profit-motive-related interventions and their potential to displace tenants through higher rental fees, resulting only in more income for landlords, or in the potential for increased marginalization caused by negative messaging [61]. We hypothesized that simply constructing toilets would inevitably lead to the displacement of many tenants. However, we established that many landlords did not think that tenants would pay
for differences in sanitation quality [59] and that tenants were willing to pay [60], and thus focused on increasing the functioning of the market. There were few plots with low-quality housing and high-quality toilets, denying tenants the opportunity to access a plot with a higher-quality toilet, and while some tenants might not choose to or be able to pay more, the negative impact of allowing a larger range of choices was thought to be much smaller in this case. We also determined not to use any negatively-framed messages, instead focusing on the benefits that had been underestimated by landlords previously.

- It is great that exact inputs have been added in terms of the scale and numbers of presenters/facilitators, as this can assist replicability and strengthens and grounds contribution. I still hold that some discussion of costs is critical to be clear about what it would take to replicate such an approach in other contexts (e.g. enlisting the creative agency etc. which assume likely to operate on commercial rates). Without this, the scalability of the approach isn't clear.

We have added a brief discussion of the cost data and a table of development and delivery costs to facilitate consideration of the scalability of the approach as Appendix A.

- What does 'guided by appeal to its theory of change' (lines 131-132) is unclear- I don't understand what this means, and more generally, I am not fully clear how the authors are using the terminology of 'theory of change'- strengthening this conceptually may help the paper overall.

Have removed the term “theory of change” and replaced with “…is specified by the approach.” as the point is to capture that the approach, regardless of the level of detail specified, gives guidance for the entirety of the process, and goes beyond simply suggesting potential determinants.

- Suggest using past-tense consistently throughout the results section when describing the intervention (eg line 442 uses present tense- 'allows').

Correction made.

- Ensure sufficient justification in the literature for points made in the discussion. Eg lines 429-430 mentions 'based on empirical findings for behaviours with similar characteristics, should provide relevant reference(s).

Sentence removed.
- Avoid speculation (and sort out the wording)- line 499 asserts that the wider range of interventions is likely to be produce more appropriate and hence more effective interventions. This paper didn't assess the intervention, so should be careful about what can and can't be claimed. And the repeated use of 'intervention' in this sentence is confusing.

These lines argue that exploring a wider array of intervention options is likely to produce better interventions. We have clarified the text as follows:

Exploring a wider range of behavioral determinants and delivery mechanisms is likely over the long run to produce more effective interventions given the importance of choosing the right messengers and channels [68] to intervene on behaviors with complex, multi-level determinants [69].

- Please re-work the conclusion of the paper, which remains unclear (part of which comes back to clarifying the purpose of the paper and then delivering on that). At the moment, the use of future tense ('will' consist) is strange. The final paragraph also is not quite clear or easy to follow.

This intervention was developed for a relatively little-studied behavior (demand-driven improvement of shared sanitation facilities) by adapting findings from similar kinds of behaviors as well as utilizing a generic framework for understanding human behavior. This theory-driven process produced an intervention that facilitates the advancement of applied behavioral science theory as well as knowledge related to this specific behavior.

Jason Corburn (Reviewer 3):

We assume that the filler text that was present here along with the “accept with no revisions” is an indication that no comments were provided by this reviewer.