Author's response to reviews

Title: Promoting Action Control and Coping Planning to Improve Hand Hygiene

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Author's response to reviews: see over
Dear Editor, dear Jane M. Dalumpines,

Hereby we are resubmitting our manuscript “Promoting Action Control and Coping Planning to Improve Hand Hygiene” (MS ID: 2312720671594276) by Benjamín Reyes-Fernández, Sonia Lippke, Nina Knoll, Emanuel Blanca-Moya and Ralf Schwarzer to be published in BMC Public Health.

Thank you for the feedback on how to improve the manuscript. We provide a response to the reviewers, with details of changes made, in the following pages.

Sincerely,

Dr. Sonia Lippke on behalf of all coauthors
Reviewer Alexandra Nicholson (referee 2)

Thank you for your responses to my comments, they were very helpful to understand the research better.

We are also very thankful for your comments.

I agree that your title better reflects the article content, and I have made some other suggestions as follows:

- Minor Essential Revisions
  1. Apologies I didn’t pick this up last time but I think the sentence on lines 55-57, starting with ‘Thus…’ does not read well and could be omitted.

    Thank you. We have done as suggested. It reads now ‘Replicating effects…’ (now line 56)

  2. The reference on line 80 was different in the last version. I think if there are now two references in the paper that have shown interventions taking into account psychological variables to be effective these should all be listed rather than one as an e.g. In addition line 294/295 needs to have the same references as line 80. I also think you mean ‘effective’ rather than ‘efficient’.

    Thank you for the suggestion. We have written ‘effective’ instead of ‘efficient.

    The reference to Rejeski et al (2011) has been added again, as suggested by the reviewer. In lines 80-81 it now reads ‘In previous studies, such interventions have been found to be effective (e.g., [6, 17])’. The reference was also added in line 295.

  3. Line 108 replace ‘This…’ with ‘A’

    Thank you. Line 108 (now line 110) has the changed sentence, and reads as follows: ‘A brief educational intervention was designed’

  4. Line 112 replace ‘will be..’ with ‘were’

    Thank you. We have done as suggested. Now it reads ‘the following hypotheses were tested’ (line 114)

  5. Thank you for adding information about the baseline sample in the methods, and reasons for drop out (lines 125-130). I think line 126 could read better, something like ‘non-completers cited academic duties (field work, meetings) as reasons for drop out.’ I think this information is better placed at the beginning of
the results section under Drop-out analysis and randomization checks as you refer to drop outs in this section. You also refer to T2 which is not explained until the measures section, hence moving this information to after the measures section makes sense in this respect also.

The suggested line was added. We have also included this information in the results section under Drop-out analysis and randomization checks. So, this information is easily accessible to the reader either when reading the sample description in the methods section or when trying to understand the drop out in the results section.

In the methods section it reads now ‘A sample of 440 students participated at baseline, and 307 of them took part at Time 2 (307 completers, 133 non-completers). Non-completers cited academic duties (field work, meetings) as reasons for drop out.’ (lines 127-129)

In the results section it reads ‘From the original sample (n = 440) 307 were completers, and 133 were non-completers. Non-completers cited academic duties (field work, meetings) as reasons for drop out.’ (lines 197-198).

6. Line 131 could read better, something like ‘To avoid contamination between conditions, classroom groups were randomized to determine whether students received the experimental condition or the control condition. Class lists, provided by the university, were used by researchers to randomise classroom groups (clusters). Participants remained blind to their allocation during the study.’

We have followed your suggestion (see lines 132-135). Thank you very much.

7. Lines 135-137: ‘Given that…group’. I think these should be deleted. This issue is more about contamination across groups: if students from groups mix and share information about the intervention after T1 and prior to completion of T2 measures. This sounds possible based on the timeframes of data collection. I disagree that those in the experimental group would fail to notice a difference between their condition and that of the control. I think receiving a pamphlet and completing a planning task, although brief, could be noticed as distinctive.

Thank you for pointing this out, we deleted this sentence as suggested.

8. Lines 140-141, not needed as this is information provided in the next section.

These lines were deleted. Thank you for the suggestion.

9. Lines 164-165 are duplicates and need deleting.

Thank you. Duplicated lines were deleted

10. I think the abstract needs some information about the intervention: i.e. that it was an educational pamphlet and a planning task.
11. Line 240. I think ‘those variables’ should be replaced with ‘social-cognitive variables’.
   We appreciate this feedback. The abstract now reads ‘the experiment resulted in a clear increase in social-cognitive variables in comparison to the control condition’ (lines 239-240)

12. Line 271. ‘in behaviour’ not ‘on behaviour’
   Thank you. Now it reads “it was not sufficient to produce changes in behaviour over time” (line 272)

13. Line 296. I think this read better in the previous draft… ‘There are some limitations in this study’ to focus the reader back to your research. It could also read ‘There were some limitations with our study’ or something similar.
   Thank you. We followed your suggestion. Now it reads ‘There are some limitations in this study’ (line 296).

14. Line 297-301, this is a very long sentence and hard to follow. It could be simplified to something like ‘This could be overcome by using concurrent direct observation, where observers were trained to assess the quality and quantity of health care associated hand hygiene behaviours.’ It would read better without ‘health care associated’ but this may be needed for the associated reference.
   Thank you. We have followed your suggestion, deleting also ‘health care associated’. It reads now ‘This could be overcome by using concurrent direct observation, where observers are trained to assess the quality and quantity hand hygiene behaviours’ (lines 299-300)

15. Line 309: you need to note that the limitation is ‘cluster randomisation at the classroom level’. I think cluster randomisation is a valid design to use and more appropriate in the circumstances. The issue with cluster randomisation at the classroom level, rather than University level, is contamination across groups between T1 and T2 which could have affected the questionnaire responses at T2. In addition I think that line 310 – 311, starting ‘Future…’ is not appropriate and should be deleted. I think the individual level would be far too resource intensive, and blinding would remain an issue.
   Different randomization strategies have their pros and cons. Although there is no 100% guarantee of protection against contamination, cluster randomization has been considered as lessening risk of experimental contamination (Donner & Klar, 2004). We consider that increasing the number of clusters (classrooms) or even using a large number of other kinds of cluster unit (universities, communities) would be ideal.
   It reads now as follows:
   “Additionally, although cluster randomization might have some advantages over randomization at the individual level [31], the reduced number of cluster units is a limitation, and may have contributed to the baseline differences found for behaviour and action control. A larger
number of cluster units, either classrooms, universities, or communities, should be included for further research." (lines 309-313).

16. I think the sentence on line 315-317, starting ‘This can…’ needs rewording. The understanding is not fully clear to me. I think you are saying that the failure of the intervention to result in visible changes to hand hygiene behaviour may be due to the brief nature of the intervention, or the student population tested who were not all health care professionals. I agree that the brief nature of the intervention may have affected results, as may the student population due to the baseline differences in hand hygiene behaviour. But is the understanding then that health care professionals will be more likely to act on the messages of the intervention? I'm not sure that this is the case.

We do not assert that health care professionals are more likely to act as a result of the intervention and we did not follow a design nor collected data to examine this. It may be the case that health care professionals were in settings with higher availability of products for hand hygiene, but all of our sample consists of students, even when some of them study health care disciplines.

We preferred to reword the sentence, so that environmental factors were emphasized, as follows: ‘This can be due to the parsimony of the treatment or to environmental factors, such as availability of products for hand hygiene [32], which were not assessed in the current study’ (lines 317-319).

17. Line 318. I think the use of the word ‘then’ is too strong, as you have not shown an effect on behaviour.

We have reworded the sentence. It reads now ‘Further theory-guided educational interventions should be used testing psychological mechanisms, which may enable more behaviour change’ (lines 320-321).

- Discretionary Revisions
1. Suggestion that the background in the abstract may read better as: ‘We examined a brief educational intervention addressing hand hygiene self-regulatory mechanisms, and evaluated which psychological mechanisms may lead to hand hygiene behaviours’.

   Thank you. We have done as suggested. The background reads: ‘We examined a brief educational intervention addressing hand hygiene self-regulatory mechanisms, and evaluated which psychological mechanisms may lead to hand hygiene behaviours’ (lines 27-29)

2. End of sentence line 71 ‘..or when travelling.’ could benefit from a reference. The following reference has been added, now in line 72:

3. Line 116/117. I'm not sure why you have changed the wording in your third hypothesis.
   In a previous version we mentioned planning as a general construct, although we addressed coping planning. Therefore, we preferred the following wording:
   “Changes in coping planning and action control, specified as mediators, will account for some amount of individual differences in behaviour”.

4. Line 290. Suggest change to ‘...behaviour, confirming hypothesis 3.’
   We have replaced the expression ‘...behaviour, confirming the regarding hypothesis (Hypothesis 3)’ with ‘and behaviour, confirming hypothesis 3’ (lines 290-291), as suggested.

5. Line 313, I think you need to consider the use of ‘supposed’. This may be a translation issue. I think the word ‘thought’ may be more appropriate.
   We have followed your suggestion. Now it reads: ‘...the present study explored the behaviour change strategies (planning and action control) that are thought to translate intervention content into behavioural outcomes’ (lines 314-315).

Level of interest: An article whose findings are important to those with closely related research interests
Quality of written English: Acceptable
Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.
Declaration of competing interests: I declare that I have no competing interests.
Reviewer's report: Promoting Action Control and Coping Planning to Improve Hand Hygiene

This is a nice paper on an interesting theme. It should be published eventually, after polishing a few unclear points. Some of them are listed below. In statements like “Gender as a covariate and classroom as a cluster variable were not associated with T2 behaviour.” (which appear several times in the text), what is the exact meaning of a cluster variable not associated with a response? Is the statement based on a formal test? If yes, on what hypothesis is tested and in what model? My feeling is that the statement aims at the inference about variance of random classroom effect (whether it is zero or not) in a mixed effect type of model. This is a notoriously difficult problem. Moreover, it seems that such tests are not really necessary, given the interests of this paper. It simply seems that the (potential) correlation induced by the classroom effect should be taken into account in the model and subsequent inferences like tests and confidence intervals for quantities of main interest – like trt*time interactions and others (mixed model with random classroom effect is certainly one way to do this). At any rate, the current statements should be either explained in detail (and motivated), or omitted. The model on which the inference is based should be given in terms of a quasi-formula (containing response, explanatory variables of interest, adjustment covariates - if there are any, random effects – and their assumed distribution). General remark: even if the random effect would not seem very important, it should not be dropped out of the model (based on just “purely statistical” arguments in the style of “variable selection”), it should stay in the model on the account of the study design per se.

We thank the reviewer for his/her insightful comment. Figure 2 includes “Classroom”, our cluster variable, in the serial model. The procedure conducted, implemented by Hayes' (2013) macro PROCESS, is called “fixed effect approach” (see Cohen et al., 2003, pp.539-544). This approach belongs to the context of OLS regressions. It consists of using dummy codes for our groups (classrooms) to account for group mean differences on our dependent variable(s). It partials out effects due to cluster from estimates of the coefficients and standard errors in the model and is recommended when there is an small number of clusters in the data set.

We are sorry for the confusion and have replaced “cluster” by control and added the regarding information on the analyses as we outline below.

What is the exact meaning of a cluster variable not associated with a response?
It means that our basic results hold even after partialling out effects coming from our cluster (classroom). In other words, we were interested in differentiating the effects coming merely from the condition assignment.
(experimental/control) and subsequent cognitive processes from any other effect coming from classroom characteristics where subjects were. We have added the following sentence to the results section to further clarify the statement that gender and classroom were not associated with T2 behaviour: ‘Thus, the variance found at the level of behaviour is basically attributable to the chain involving the intervention and subsequent cognitive processes rather than to gender or classroom characteristics’ (lines 258-260).

In any case, the results are basically the same when using or not the “fixed effects approach”, showing that the experimental condition is serially associated with changes in action control and coping planning and subsequently with differences at the behavioural level, independently of the classroom of the participants.

Concerning the manuscript, we have also added information on the fixed effects approach, as follows, to facilitate its interpretation: ‘To control for classroom effects, classroom was specified as a control variable (fixed effects approach, see e.g., Cohen et al., 2003, pp. 539-544). In this approach the control variables are dummy coded to partial out their effects in the model’ (lines 189-193)