Author's response to reviews

Title: Falls and Falls Efficacy: The Role of Sustained Attention in Older Adults.

Authors:

Aisling M O'Halloran (aisling.ohalloran@trilcentre.org)
Nils Pénard (penardn@tcd.ie)
Alessandra Galli (a.galli@donders.ru.nl)
Chie Wei Fan (cfan@mater.ie)
Ian H Robertson (iroberts@tcd.ie)
Rose Anne Kenny (rkenny@tcd.ie)

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Author's response to reviews: see over
1st December, 2011

RE: MS: 7265475605783961, entitled "Falls and Falls Efficacy: The Role of Sustained Attention in Older Adults."

Dear Dr Arlene Pura,

Thank you very much for considering our manuscript for publication and for the very helpful and detailed comments from you and from the reviewers. We would very much like to accept your offer to resubmit a revised version of the manuscript.

We have made the minor revisions to the manuscript taking into full consideration the comments of the reviewers, and we include below an itemized, point-by-point response to their comments. All changes are highlighted in yellow in the manuscript also.

We hope that this revised version of the manuscript will be to your satisfaction and we look forward to hearing from you.

Best regards,
Dr Aisling O’Halloran.
**Editor Comments:**

*Editor: Arlene Pura*

**General comments**
Thank you for revising your manuscript. The revisions were assessed as being satisfactory. The reviewers made some suggestions for some minor revisions to help clarify aspects of your manuscript. Once these completed in a satisfactory fashion, I would be pleased to recommend acceptance of your manuscript. Please provide a letter summarizing the changes that you have made and highlight, using track changes or yellow highlights each part of the manuscript where a change was made.

We would be grateful if you could address the comments in a revised manuscript and provide a cover letter giving a point-by-point response to the concerns.

**Reply:**
We have made every effort to comply with the recommendations for minor revisions suggested by both reviewers and we present these changes point by point below. All changes are highlighted in yellow in the manuscript also.

**Reviewer Comments:**

*Reviewer #1*

*Reviewer: Jasmine Menant*

**Reviewer's report:**

The authors have responded satisfactory to the editor and reviewers’ comments. The paper reads well and is much improved. I include some minor discretionary revisions below.

**Comments:**
Methods: Move the “Participants” subsection of the methods to below the “Setting” subsection.

**Reply:**
We have moved the “Participants” subsection of the methods to below the “Setting” subsection in the manuscript as requested.
See Page:7-8, Methods.

Results pages 13-14: the results could be written more succinctly by not repeating the data found in the figures (i.e no need to specify specific times in the text if they are provided in the figures) and by grouping the correlations data together and providing ranges (i.e “MFES score was significantly correlated with X, X and X in the fallers group (r=X-X, p=X) [...]”). This would make the results easier to read.
Reply:
We have removed the specific times recorded for the mean and variability of reaction times for fallers, non-fallers and for faller type from the results section. We also removed the number of omission errors as these data can be observed from Figure 1. See Page 14-15, Results.

“Differences in the physical, psychosocial and cognitive measurements between non-fallers and fallers are summarised in Table 1 and a comparison of the SART measures between non-fallers and fallers is shown in Figure 1. There was a significant difference in mean RT ($t(456) = 4.40, p < 0.001$), SDRT ($t(456) = 2.74, p = 0.006$), FFV ($t(382) = 3.10, p = 0.002$) and omission errors ($t(456) = 2.55, p = 0.011$) between fallers and non-fallers. However, there were no significant differences in SLV or commission errors.”

and,

“A comparison of the SART measures between non-fallers, single fallers and recurrent fallers is shown in Figure 2. One-way ANOVA testing revealed that mean RT differed significantly with faller type ($F(2,458) = 7.48, p = 0.001$). Mean RT increased for both single ($p = 0.008$) and recurrent fallers ($p = 0.006$), compared to non-fallers. A similar pattern was seen with respect to SDRT ($F(2,458) = 4.73, p = 0.009$). Once again variability was greater for single ($p = 0.046$) and recurrent fallers ($p = 0.042$), compared to non-fallers. The FFV measure of variability also differed significantly with faller type ($F(2,384) = 6.99, p = 0.001$). This time the greatest difference was between non-fallers and single fallers ($p = 0.004$) although there was also a significant difference between non-fallers and recurrent fallers ($p = 0.024$). Finally there was a global association between faller type and omission errors ($F(2,458) = 5.63, p = 0.004$), this association was accounted for by the difference between recurrent fallers and non-fallers ($p = 0.005$). There were no statistical differences in SLV or commission errors.”
Reply continued:
We also tried to make the correlations with the MFES score in fallers and non-fallers more succinct and readable than before. We grouped all correlations in fallers together and all correlations in non-fallers together and providing correlation ranges as suggested by the reviewer.
See Page 15, Results.

“MFES scores were negatively correlated with mean RT, SDRT, FFV and omission errors in the faller group (Correlation range: \( r_s(197) = -0.173 \) to \(-0.195, \) p < 0.05). There were no significant correlations between MFES score and SLV or commission errors among fallers. Meanwhile in non-fallers MFES scores were negatively correlated with mean RT, SDRT, FFV, SLV and omission errors (Correlation range: \( r_s(261) = -0.137 \) to \(-0.203, \) p < 0.05). Among non-fallers MFES score was not significantly correlated with commission errors.”

Table 2: A footnote below the table reminding the reader of what the various abbreviations used in the table stand for might be useful. The table is hard to read in its current format. Adding extra empty lines between the different models might make it clearer.

Reply:
Instead of adding a footnote explaining the abbreviated variable names we have included the full variable name in the table. We have also double spaced the table and have numbered each separate logistic regression model in an effort to make it easier to distinguish between each model.
See Page 35, Table 2.

Reviewer Comments:
Reviewer #2
Reviewer: Kim Delbaere
Reviewer's report:

Comments.
Could you please provide descriptive characteristics of the 74 participants who had consecutive zero answers, and compare to the rest of the sample.

Reply:
We have summerised the descriptive characteristics of the 74 participants who had nonzero answers and compared them to the rest of the sample at the end of the “Data pre-
processing for FFT analysis” subsection in the “Sustained Attention to Response Task (SART)” section of the Methods.

See Page 10-11, Methods.

“The group of 74 individuals with more than 6 consecutive zero answers were significantly older (75.4 versus 71.0 years, \( p < 0.001 \)), with lower mean MMSE scores (26.6 versus 28.0, \( p < 0.001 \)) but not CFQ scores, and had a higher percentage of fallers (56.6\% versus 40.7\%, \( p = 0.011 \)) but did not differ significantly by MFES score compared to those with less than 6 consecutive zero answers. The excluded group were physically in poorer health with higher levels of comorbidity (4.9 versus 3.3, \( p < 0.001 \)), poorer gait from the TUG times (11.0 versus 8.8 s, \( p < 0.001 \)), and poorer Berg balance scores (49.9 versus 53.1, \( p < 0.001 \)). They also had lower IADL scores (25.2 versus 26.1, \( p = 0.001 \)) and reduced levels of visual contrast sensitivity (1.60 versus 1.68, \( p = 0.001 \)). However, psychologically the two groups did not differ by depression or anxiety score. Those with more than 6 consecutive zero answers also performed significantly more poorly on the traditional SART measures with longer mean RT (466 versus 381 ms, \( p < 0.001 \)), longer SDRT (227 versus 147 ms, \( p < 0.001 \)), more commission errors (8.7 versus 5.2, \( p = 0.001 \)) and more omission errors (42.7 versus 9.3, \( p < 0.001 \)).”

The fact that the group of 74 who were not included in the FFT analysis, performed so poorly on the traditional SART measures i.e. mean and standard deviation of reaction time, commission and omission errors, has lead us to include an additional paragraph in the Results section. In this additional analysis we show that if only the group suitable for the FFT analysis were considered (\( n = 384 \)), there was still a significant difference between fallers and non-fallers for the traditional SART measures. See Page 14, Results.

“Even when the group that was excluded from the FFT analysis (\( n = 74 \)), was also removed for the analysis of the traditional SART measures significant differences remained between faller (\( n = 157 \)) and non-fallers (\( n = 227 \)) for mean RT (396 versus 370
ms, p = 0.007), SDRT (161 versus 138, p = 0.009) and omission errors (10.5 versus 8.5, p < 0.014) but not commission errors.”.

See also Page: 21, Discussion.

“This was also a relatively well sample of older adults indicating that the test may be capable of detecting sub-clinical differences in sustained attention allowing for early detection and intervention. In fact even when the group of poorest performers on the task (i.e. those seventy-four individuals who had six consecutive zero responses and were excluded from the FFT analysis) were removed from the analysis, significant differences in the SART measures between fallers and non-fallers remained.”.

Also, in your discussion you have now elaborated on the potential clinical use of the SART. At one point you say: "Thus, replication of the findings presented here could confirm the potential use of this test in the clinical setting." Please be careful with your statement of the use of SART to predict falls in clinical settings. Your study has used retrospective recall of fall events in the past year, which is known to be unreliable. You have mentioned that in your limitations section but I would suggest to carefully read the paper with this limitation in mind.

Reply:
We acknowledge the reviewers point regarding the use of the SART in relation to retrospective falls in this study and the need for our findings to be replicated in a prospective study of falls in the clinical setting. We have rectified this statement in the discussion (as indicated in the reviewers comments) and elsewhere throughout the paper. See Page 3, Abstract – Conclusion.

“Greater variability in sustained attention is strongly correlated with retrospective falls and to a lesser degree with reduced falls efficacy. This cognitive measure may provide a novel and valuable biomarker for falls in older adults, potentially allowing for early detection and the implementation of preventative intervention strategies.”.

See also Page 6, Introduction.

“We hypothesised that increasing RT variability and higher error rates, signifying poorer sustained attention, would be associated with falls and falls efficacy due to a combination of age-related NA depletion and primary ageing of the frontal cortex.”
Thus, if the findings presented here for retrospective falls were replicated for prospective falls, it would confirm the potential use of this test in the clinical setting.

Sustained attention variability may provide a novel and valuable biomarker for falls in older adults, potentially allowing for early detection and the implementation of preventative intervention strategies.