Author's response to reviews

Title: Mobility and cognition are associated with wellbeing and health related quality of life among older adults

Authors:

Jennifer C Davis (jennifer.davis@ubc.ca)
Stirling Bryan (stirling.bryan@ubc.ca)
Linda C Li (lili@arthritisresearch.ca)
John R Best (john.best@ubc.ca)
Chun Liang Hsu (liang.hsu@hiphealth.ca)
Caitlin Gomez (caitlin.gomez@hiphealth.ca)
Kelly A Vertes (kelly.vertes@hiphealth.ca)
Teresa Liu-Ambrose (tlambrose@ubc.ca)

Version: 3
Date: 27 January 2015

Author's response to reviews:

BMC Geriatrics

02 September 2014,

Dear Professor Cameron,

We are pleased to submit our manuscript titled, “Mobility and cognition are associated with wellbeing and health related quality of life among older adults” to BMC Geriatrics. The manuscript is not being considered for publication elsewhere.

Thank you for the insightful comments from the Editorial Team and the Reviewers. We have been diligent in incorporating the reviewers’ and editorial team comments. These suggestions are addressed in the ‘Response to Reviewers’ document. These revisions are highlighted using the ‘Track Changes’ function in Microsoft Word. We also attached a clean version of the manuscript with ‘Track Changes’ accepted.

We do hope the detailed response to Editorial and reviewer comments is helpful in your evaluation of this revised manuscript and we look forward to clarifying further as needed.

All authors have no conflict of interest and financial disclosures to declare.

Yours Sincerely,
Jennifer C. Davis, PhD

Response to Reviewers

Additional Editorial Comments:
Thank you for submitting your paper to BMC Geriatrics. Two reviewers have given their comments to the manuscript. The main concern with the manuscript that one of the reviewers and I see, is the overlap with your previous paper. You need to demonstrate much clearer what is novel with the current paper. Additionally, the reviewers had several comments to the manuscript that you have to answer and revise accordingly before I can take decision on acceptance.

Response: Thank you for the opportunity to revise and clarify the novel aspect of this present manuscript. Please see our ‘Response’ & ‘Action’ comments to reviewers 1 & 2. We highlight that the key thrust of our previous paper [1] was to ascertain the construct validity of the ICECAP-O and the EQ-5D in a population at heightened risk of falls and mobility impairments. As such, in the previous paper, ‘gold standard’ variables that measure falls risk, cognitive function and daily function were selected as the dependent variables. In the present study, health related quality of life and wellbeing were the two primary dependent (rather than independent) variables. We also attach the previous paper as an additional appendix.

Reviewer’s report
Title: Mobility and cognition are associated with wellbeing and health related quality of life among older adults
Version: 2
Date: 3 November 2014
Reviewer: Kristin Taraldsen
Reviewer's report:
This cross-sectional study explores the association between cognitive function and mobility and wellbeing and health related quality of life in a sample of 229 home dwelling older persons. Suggest major compulsory revisions of the manuscript prior to any decision on publication can be reached. The most important concern is the justification of why this study is important, and it would be helpful to be very clear in the structure, especially the presentation of the methods and results. The authors should also describe the sample more in details.

Response: Thank you for the opportunity to clarify the presentation of our manuscript. We have added in justification of why this manuscript is important in the introduction. Understanding key determinants of HRQoL and wellbeing will help inform future intervention strategies aimed at combatting cognitive and functional decline and thus striving to maintain or improve individuals HRQoL and wellbeing. HRQoL and wellbeing are essential components contributing to healthy aging. Please also see our responses to Reviewer 2 comments. The presentation of the methods and results has now been revised.

Action: Please see Introduction, Methods and Results.
Minor Essential Revisions
• Suggest that you move the sentence, line 103-104, to “study design”
Response: The manuscript has been modified accordingly.

Action: On page 5, it now reads: “From June 2010 through October 2013, all patients presenting to the Vancouver Falls Prevention Clinic were invited to participate in a cohort study.”

• If available include a definition in the inclusion criteria for “recently had a stroke”
Response: The manuscript has been modified accordingly.

Action: On page 6, it now reads: “We excluded those with a neurodegenerative disease (e.g., Parkinson’s disease) or dementia, patients who has a stroke in the past 12 months, those with clinically significant peripheral neuropathy or severe musculoskeletal or joint diseases, and anyone with a history indicative of carotid sinus sensitivity (i.e., syncopal falls).”

• Suggest that you refer to wellbeing and health related quality of life and not Eq-5D-3L and ICECAP-O, this is also suggested for the headings in the method section
Response: The manuscript has been modified accordingly.

• Suggest that you describe the assessment as “examination” instead of “baseline”
Response: The manuscript has been modified accordingly.

Action: On page 5, it now reads: “We conducted a cross-sectional analysis of 229 participants (complete case analysis) who received an initial examination at the Vancouver Falls Prevention Clinic.”

• Delete “TUG” line 164
Response: Thank you, this is now deleted.

• Suggest that you revise your Table 1 according to the text.
Response: Table 1 has been revised accordingly.

Action: On page 19, please see Table 1.

• Line 215 “At baseline, this cohort of community-dwelling senior women...” should be corrected
Response: Thank you, this is now corrected.

Action: On page 10, it now reads: “At baseline, this cohort of community-dwelling older adults had a mean (SD) EQ-5D-3L HSUV of 0.78 (0.22) and a mean (SD) ICECAP-O of 0.82 (0.12).”

Level of interest: An article of importance in its field
Quality of written English: Acceptable
Statistical review: No, the manuscript does not need to be seen by a statistician.
Reviewer's report

Title: Mobility and cognition are associated with wellbeing and health related quality of life among older adults

Version: 2

Date: 19 December 2014

Reviewer: Rachel Ward

Reviewer's report:

I think that this could be an important manuscript that significantly contributes to the field. Although, I have one major concern. The authors have previously published on very similar associations and do not explicitly state what additional novel contributions the submitted manuscript will make to the field.

Major Compulsory Revisions

1. The author group's work cited in reference 32 appears to be similar to the analysis in the submitted manuscript. Please describe how this work is different and what new contributions this work makes to the field.

Response: Thank you for the opportunity to clarify the novel contribution of this current paper. We have modified our introduction and conclusion to better highlight the additional contribution this paper makes beyond that of reference 32. Specifically, we highlight that the key thrust of our previous paper [1] was to ascertain the construct validity of the ICECAP-O and the EQ-5D in a population at heightened risk of falls and mobility impairments. As such, in the previous paper, ‘gold standard’ variables that measure falls risk, cognitive function and daily function were selected as the dependent variables. In the present study, health related quality of life and wellbeing were the two primary dependent (rather than independent) variables.

Action: On page 5, it now reads: “Given that both impaired cognitive function and impaired mobility contribute to loss of functional independence which is associated with reduced quality of life, greater risk for institutionalization, and increased mortality – there is a critical need to further investigate the specific contribution of cognitive functioning and mobility to HRQoL and wellbeing. Understanding key determinants of HRQoL and wellbeing will help inform future intervention strategies aimed at combating cognitive and functional decline and thus striving to maintain or improve individuals HRQoL and wellbeing.”

On pages 14 & 15, it now reads: “This study highlights that both mobility and cognitive function are associated with HRQoL and wellbeing. Specifically, this study provides preliminary evidence that the ICECAP-O taps into important aspects of cognition – executive functions and the EQ-5D does not. As such, this study provides a platform for future longitudinal studies and intervention studies to 1) examine temporal relationships and mediating factors of mobility and cognition with HRQoL and wellbeing, 2) explore the use of appropriate instruments based on the intended impact of the intervention and 3) target mobility and cognition to improve wellbeing and slow age related declines.”
Minor Essential Revisions

2. There are a few typos within the manuscript that should be corrected.
Response: Typos are now corrected.

3. What is meant by “preference-based outcome measure”?
Response: Preference-based outcome measures are distinct from other health status instruments because they provide insight into how health outcomes are valued as compared with a measure functional performance such as the Timed Up and Go. Valuations for preference-based outcome measures are based on individuals within society’s unique preferences for specific health states.

Action: On page 3, it now reads: “Preference-based outcome measures are distinct from other health or wellbeing status instruments because they provide insight into individuals within society’s valuations of specific states of health or wellbeing status.”

4. The first sentence of the last paragraph of the background is overstated. Little support is given on why cognition and mobility are two of the most pressing health care issues of the 21st century. Although, this sentence could be supported by citing the rapid aging of the population. Also, the aim of this paper is to show that these factors are associated with HRQoL and wellbeing, so to say that they critically impact these outcomes in the background is not sufficiently supported yet.

Response: Thank you for highlighting the need for more justification and rationale behind this statement. We have modified the last paragraph.

Action: On page 4, the first sentence is now cited. It now reads: “Impaired cognitive and mobility are geriatric giants and critically impact an older adult’s HRQoL and wellbeing [2, 3].”

On page 5, it now reads: “Given that both impaired cognitive function and impaired mobility contribute to loss of functional independence which is associated with reduced quality of life, greater risk for institutionalization, and increased mortality – there is a critical need to further investigate the specific contribution of cognitive functioning and mobility to HRQoL and wellbeing. Understanding key determinants of HRQoL and wellbeing will help inform future intervention strategies aimed at combatting cognitive and functional decline and thus striving to maintain or improve individuals HRQoL and wellbeing.”

5. Line 164 lists the TUG but does not describe it. Was it included as a measure?
Response: We have deleted the TUG as it was not included in our paper.

Action: “TUG” on line 164 is now deleted.

6. It is clearly described why the MOCA was included in the analysis over the MMSE, but why wasn’t the DSST chosen for the regression analysis?
Response: MOCA is much more sensitive to subtle changes in cognitive function. Further, the MoCA and the DSST were co-linear and so they were not both able
to be included in the final regression model. As such, the variable (i.e., MoCA) that demonstrated the strongest bivariate association was included in the final regression model. We have clarified our variable selection in the methods section.

Action: On page 9, it now reads: “Co-linearity of all variables was ascertained and for variables that were highly co-linear, the variable with the strongest bivariate association was included in the final regression model.”

7. What comorbidities are included in the FCI?
Response: The following comorbidities are assessed using the FCI: Arthritis, Hypertension, Hearing impairment, Upper gastrointestinal disease, COPD, Osteoporosis, Angina, Anemia, Depression, Diabetes, MI, Asthma, Bowel disease, Dementia, Peripheral vascular disease, Visual impairment, Cancer, Anxiety, Stroke/TIA, Neurologic disease, Liver disease, Congestive heart failure (CHF), Kidney disease, Migraine, Back pain [4].

8. When testing assumptions, was linearity of the relationships between the dependent and independent variables assessed?
Response: Yes, the relationships between key continuous independent and dependent variables were plotted.

Action: On page 9, it now reads: “The nature of the relationship between the continuous independent (SPPB, PPA, MoCA and MMSE) and dependent variables (ICECAP-O and EQ-5D-3L) of interest were examined using two-way scatter plots.”

9. The analysis yielding the results in Table 2 is not described in the Statistical Analysis section of the Methods. Wasn’t this the secondary aim?
Response: Thank you, we have revised the Statistical Analysis section to appropriately described the analyses that produced Table 2.

Action: On page 9, it now reads: “Bivariate relationships between the independent variables and the two dependent variables of interest were ascertained using Pearson correlations. Linear regression models were constructed with the following two dependent variables: wellbeing (assessed using the ICECAP-O) and HRQoL (assessed using the EQ-5D-3L).”

10. Line 216 says that the cohort of senior women had mean scores of... Didn’t this cohort include men too?
Response: We have corrected this error.

Action: Women now reads “older adults”

11. Line 233 should list the known covariates that were adjusted for in the models.
Response: The manuscript has been modified as suggested.
sex and MoCA for wellbeing) (p < 0.05).”

12. The sentence in line 259 is difficult to follow and overstates the findings. It says that the constructs of the ICECAP-O may be more sensitive to changes in cognitive function but this analysis is cross-sectional and thereby did not include change.

Response: We have modified this statement to more appropriately reflect the constraints of a cross-sectional analysis.

Action: On page 13, it now reads: “The ICECAP-O also does not include a cognitive domain. However, by design the constructs and capabilities to achieve the desired functionings that comprise the ICECAP-O may better tap into aspects of cognitive function compared with the constructs of the EQ-5D.”

13. I’m having trouble connecting the ideas presented in the second paragraph of the discussion. Perhaps it should be more carefully described. Particularly the last sentence. Is the point that the ICECAP-O is able to tap into individuals’ functionings or should this be capabilities? I thought the point was that the ICECAP-O measures capability whereas the EQ-5D does not.

Response: Thank you for the opportunity to clarify this paragraph. The premise behind the ICECAP-O is that it is based on assessing an individuals capability to achieve valued functionings (i.e., an individual's ability to achieve desired functionings) [5]. The ICECAP-O is a capability index whereas the EQ-5D is a measure of health status (health related quality of life).

Action: On page 13, it now reads: “Given that the ICECAP-O is a capability index – it is designed to ascertain an individual’s capability to achieve valued functionings [5]. Hence, it is highly conceivable that performance on the SPPB may be related to the domains of security (thinking about the future without concern), role (doing things that make you feel valued), enjoyment (things that make you feel valued). We previously demonstrated the association between measures of mobility, balance and falls risk with HRQoL and wellbeing [1]. For example, it may be that having mobility allows you to do the things that you want to do and to do the things that makes you feel valued – the ICECAP-O is able to tap into individuals’ capabilities (i.e., their capability to achieve desired functionings).”

14. Can you speculate as to why measures of executive function would be associated with wellbeing but not HRQoL?

Response: Executive functions are higher order cognitive processes that control, integrate, organize, and maintain other cognitive abilities [6]. These cognitive processes include the ability to concentrate, to attend selectively, and to plan and to strategize. Intact executive functioning is essential to the ability to carry out health-promoting behaviours [7], such as medication management, dietary and lifestyle changes, self-monitoring of responses, and follow-up with health care professionals. Executive functions decline substantially with aging [8]. One hypothesis as to why measures of executive function would be associated with wellbeing but not HRQoL is due to the constructs each of these instruments taps into. The ICECAP-O taps into an individual’s capability to achieve desired
functionings. The EQ-5D measures five distinct domains (mobility, self-care, usual activities, pain and depression). It may be that executive functions are more strongly related to an individual’s ability to achieve specific functionings/capabilities rather than the concrete more task specific domains measures by the EQ-5D.

Action: Please see modified introduction on page 3. We have also added a paragraph in the discussion to expand the discussion of executive function and its association with wellbeing.

On page 12, it now reads: “Executive functions are higher order cognitive processes that control, integrate, organize, and maintain other cognitive abilities [6]. These cognitive processes include the ability to concentrate, to attend selectively, and to plan and to strategize. Intact executive functioning is essential to the ability to carry out health-promoting behaviours [7], such as medication management, dietary and lifestyle changes, self-monitoring of responses, and follow-up with health care professionals. Executive functions often decline substantially with aging [8]. Wellbeing, assessed using the ICECAP-O, taps into an individual’s capability to achieve desired functionings (i.e., this can be thought of as an individual’s capacity to follow through with what they want to achieve). It is conceivable that an individual with higher executive functioning may be more competent in achieving their targets which may explain the significant association with wellbeing and not HRQoL.”

15. The strengths and limitations should be described in more detail. For example, participants were referred by health care providers to the study based on perceived fall risk. On one hand, this is a very specific population and results may not be generalizable to others. On the other hand, this is an at-risk population for which findings are highly relevant.

Response: We have expanded this section as suggested.

Action: On page 14, it now reads: “Participants included in this study were referred by health care providers to the study based on perceived fall risk and specifically sustaining a fall in the past 12 months. As such, the results of this study may not be generalizable to other low risk populations. On the other hand, this is an at-risk population for which findings are highly relevant for future targeted intervention. This cross-sectional analysis does not allow us to ascertain the temporal relationship between mobility and cognition in relation to HRQoL and wellbeing. This analysis was based on a complete case analysis. We chose not to report the imputed dataset here because the findings of the imputed data set concurred with the complete case analysis. The next logical step is to conduct a longitudinal analysis ascertaining the key predictors of change in wellbeing and change in HRQoL over time. This will help us tailor and target future intervention strategies most effectively.

16. The conclusions in the last paragraph of the discussion are overstated. The study does not really confirm that mobility and cognitive function play a critical role in HRQoL and wellbeing because this analysis was cross-sectional and findings have not been repeated. The study does suggest that such a role exists, however. Also, the ICECAP-O may tap into important aspects of cognition.
Response: We have tempered our findings to more appropriately reflect the cross-sectional nature of this paper.

Action: On page 14, it now reads: “This study highlights that both mobility and cognitive function are associated with HRQoL and wellbeing. Specifically, this study provides preliminary evidence that the ICECAP-O taps into important aspects of cognition – executive functions and the EQ-5D does not.”

17. Please define the abbreviations in a label/footer for each table.
Response: All Tables have now been modified as suggested.

Discretionary Revisions

18. I think the aim can be more accurately described in the abstract and background. It states that the primary objective is “to identify key factors related to mobility and cognitive function that explain variation in wellbeing and HRQoL.” I think factors is the wrong word here; it’s not specific enough. Maybe “measures of mobility and cognitive function” would be a more accurate description. Or maybe the aim is really to assess the amount of variation in wellbeing and HRQoL that is explained by mobility and cognitive function.
Response: Thank you for this suggestion.

Action: On page 2, it now reads: “Hence, our primary objective was to identify key measures of mobility and cognitive function that explain variation in wellbeing and health related quality of life (HRQoL) among community dwelling older adults.”

19. I’m not clear on what is meant by the first sentence of the Background. Is assessing quality of life a common activity within public health or is it more appropriate to say that it should be? Does it really get the attention that it deserves? This article suggests that perhaps it does not. Maybe it’s more accurate to say that ascertaining quality of life should be a priority of public health and clinical research.
Response: This is a good distinction and our manuscript is clarified to reflect that ascertaining quality of life should be a priority.

Action: On page 3, it now reads: “Ascertaining individuals’ quality of life is a critical activity of public health and clinical research [9] and should be considered a priority.”

20. It seems that risk of falls or falls self-efficacy could mediate the relationship between mobility or cognition and HRQoL or wellbeing. This seems like a prime population in which to investigate this. Was this explored?
Response: We agree that this should be explored in this population. We have collected a measure of falls self-efficacy as well as risk of falls and we plan to explore mediation analyses after further developing the conceptual framework between mobility/cognition and HRQoL/wellbeing.

Action: We have added this as a limitation of the present analysis. On page 14, it now reads: “Further, this study did not explore any type of mediation analyses. It
is possible that risk of falls or falls self-efficacy could mediate the relationship between mobility or cognition and HRQoL or wellbeing. The next logical step is to conduct a longitudinal analysis ascertaining the key predictors and mediators of change in wellbeing and change in HRQoL over time. This will help us tailor and target future intervention strategies most effectively.

21. The second paragraph of the discussion argues that the mobility domain within the EQ-5D is not the only reason the two measures were associated. Maybe it should be mentioned that other EQ-5D domains besides mobility were also associated with the SPPB (Table 2).

Response: We chose to focus on mobility given the nature of the SPPB. We have cited Table 4 to reflect that mobility was not the only significant associated domain of the EQ-5D.

22. The order of the future directions would make more sense if they were reversed, listed according to what should be investigated next.

Response: Thank you, we have modified our future directions accordingly.

Action: On page 15, it now reads: “As such, this study provides a platform for future longitudinal studies and intervention studies to 1) examine temporal relationships and mediating factors of mobility and cognition with HRQoL and wellbeing, 2) explore the use of appropriate instruments based on the intended impact of the intervention and 3) target mobility and cognition to improve wellbeing and slow age related declines.”

23. Can you make a third column for the R-squared values in Table 3?

Response: The manuscript has been modified as suggested.

Action: Please see Table 3 on page 25.

24. Could the additional variances accounted for by the SPPB and the MOCA be included in Table 3?

Response: The manuscript has been modified as suggested.

Action: Please see Table 3 on page 25.

Level of interest: An article of importance in its field

Quality of written English: Needs some language corrections before being published

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 interests.

References


