Author's response to reviews

Title: Increase of mild disability in Japanese elders: A seven year follow-up cohort study

Authors:

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Author's response to reviews: see over
Dear Colleagues:

Please accept this Revised Research Article entitled “Increase of mild disability in Japanese elders: A seven year follow-up cohort study” for publication in *BMC public Health*.

The author has read and concurs with the content of the manuscript.

Please find attached responses to the reviewers.

We look forward to your correspondence.

Sincerely yours,

Jiro Okochi, M.D.
Responses to Reviewers

I thank the reviewers for their very thorough and thoughtful critique of this study. Please find below a detailed response to each concern raised by the reviewers.

In addition to these changes suggested by the referees, some figures are also changed to reflect further data analysis. The manuscript was revised for grammatical errors and corrected. However, if there are any additional or specific observations, please let me know.

Reviewer #1 Rom Parenboom

General

This paper presents results of a longitudinal study. However, it uses only cross-sectional methods of analyses. It would gain more if real longitudinal methods/models were used, to estimate the associations between age (in 1996), gender and conditions. For instance a method as LISREL could be used. An expert statistician should advice on that.

Response: I agree that the analysis of LISREL type is a more suitable approach for this kind of longitudinal data. The author has tried to analyze this using AMOS software. However I could not obtain a stable model. The main reason of this instability was the skewed distribution of the three level outcomes used in this study. Therefore, the author and collaborators will test the LISREL type approach with the data with different outcome variable from 2003 to 2005 which are not used in the current study, and this is truly prospective study. Then I would also like to analyze the effect of health behavior social network too. Thank you for your suggestion and the suggested problems are discussed as follows.

Changes made to the manuscript

Study limitation: page 20:

Other methodological approach of analysis, such as the use of Structural Equation Model (SEM) could have been more appropriate with this data. However the stability of the model when applied for this analysis was poor, mainly because of the distribution of the endpoint variables used in this study.

In the conclusions an overall conclusion is presented that man and woman require different prophylaxis. However if this conclusion is based on the results of the regression model, I think the author misses the point of the absolute numbers. For instance: living alone seems to be a major cause
of mild disability in females (62 persons out of 223)). However, for CVA it is only 3 out of 8). In relative terms prevention of mild disabilities caused by CVA seems wise, but in terms of reducing the burden of care, targeting the absolute numbers should have priorities (from a macro-perspective, in individual cases there is always a different weight).

Response: I agree the number of the person with the risk factors is important. However, the way I presented the table 3 in the first version of the manuscript must have caused misinterpretation of the data. For example, the prevalence of living alone was 223 (34%). Of these, 72(62+10: 32%) had developed disability in female. In contrast, of 439 women living with their family or with spouse, 129 (110+19: 29%) had developed either type of disability. And it did not achieve statistical significance by Chi square test (Man P=0.6, Woman: 0.7). The introduction of the living condition to the logistic regression model did not alter the result either. Similarly, although the numbers of factors and condition such as chronic pain, high blood pressure are high; these conditions did not show association with the development of disabilities by chi square test. To avoid the misinterpretation of the data, the authors put the absolute number of the person without the candidate risk factors into the table. In consequence, this table became large, and moved to the additional file. Some additional change was also incorporated into the discussion, according to the advice of the reviewer.

Changes made to the manuscript
The number of the persons without conditions is added to the Table 3 in the first manuscript and changed to additional file 2

Discussion: page 18
The prevalence of the chronic condition that achieved statistical significance with chi-square test was highest in eye disease in women, but it did not show association in the logistic regression model. Next to it was the chronic arthritis, osteoporosis and bone fracture, followed by the diabetes. In men, chronic lung disease is the highest followed by the CVA then chronic arthritis. This result suggested different approach in prophylaxis is required to prevent accumulation of disability in the population.

Major essential revisions

In the analysis, the presence of mild disability in the group could be a major risk factor for developing severe disability. This association has not been studied or reported.
Response: The suggested changes have been incorporated by adding the additional table, which shows the different transition among the three disability level and death; institutionalization, with some corresponding results.

Changes made to the manuscript
Additional file 1 is added to the manuscript.
Result: Page 10;
Additional file 1 shows the change of the status from 1996 to 2002. Higher transition to severe disability was more prominent in mild disability group (14%) compared with no disability group (4%). There was a difference of transition from no disability to mild disability between genders (male 10% versus female 23%). The transition from no disability to dead was higher in male (26% versus 13%).

Only those chronic conditions present in 1996 are included in the study of the incidence of disability. This can be a good choice for the first years, but to limit the factors associated with the onset of disabilities in 2002 to conditions with an onset before 1996 seems very unwise and resulting in a very weak association. A lot of conditions can result in disabilities within a shorter time period than 6 years.

Response: Although it is difficult to fully respond to the comment under the current study design, the author preliminarily analyzed the trend of association between the onset of disability and chronic condition in 1996 using the same sample. In 1997 and 1998, osteoporosis, CVA and heart disease were found to be associated in men, and osteoporosis, bone fracture, CVA, heart disease, high blood pressure and eye disease were associated with disability in women using chi square statistics. However, these results were not included in this particular study, because it was considered to be one separate topic. Nevertheless, this point is incorporated in the study limitation section as follows.

Changes made to the manuscript
Study limitation: Page 19
Some conditions could be related to the development of disabilities in shorter or longer period of observation.

The consequences of the exclusion of persons who died or were institutionalized during the period under study are briefly touched in the discussion. However, death or institutionalization can be the
result of the condition or disability and should be included as an end point in the analysis.

**Response**: 90 percent of the surviving cases had provided responses to the questionnaire study. In contrast, this number drops to 24 percent for those who institutionalized, and none in the case of death. Therefore, institutionalization and dead in outcome were not included in the risk factor analysis. This point is incorporated in the study limitation section as follows.

**Changes made to the manuscript**

**Study limitation**: Page 19-20

This study did not incorporate those elders who were institutionalized or dead at the endpoint for the analysis of the risk factors. This is because only 24 percent of the institutionalized cases provided responses to the questionnaire study, and none did so in the deceased cases, in contrast to 90 percent of the surviving cases. Inclusion of these endpoints could have improved the association with the risk factors.

Is there any explanation (hypothesis) for the lack of a significant correlation between number of chronic conditions and disability index for the years 1997 and 1999?

**Response**: suggested change is incorporated in the discussion section as follows.

**Changes made to the manuscript**

**Discussion**: Page 17

Some chronic conditions might relate to earlier death of the participants. The weak association between the number of chronic conditions and the disability index in earlier years, namely 1997 and 1999, might be due to exclusion of deceased and institutionalized cases.

In the discussion section attention should be paid to the differences between the age-groups and the increase in disability index: in the males age group 75 plus, the increase is not exponential: is this due to deaths, institutionalization or other factors? I presume that data are available to analyze this.

**Response**: The newly added Table 3 shows the different probability of death and institutionalization by age-group and gender. In males, the non-exponential increase pattern of disability might be attributable to dying, but not to institutionalization. Suggested change is incorporated in the result and discussion section as follows.
Changes made to the manuscript
Table 3 is incorporated with the additional result.
Result: page 13
As shown in Table 3, age-group also had an effect on the development of the disability. In men, higher age group showed higher proportion of deaths in 2002, while institutionalization was higher in younger age group. In women, both the proportion of deaths and institutionalization were higher in older age group.
Discussion: page 16
In woman, the transition from no disability to mild disability was higher in both age groups than men (Table 3). Higher disability index after 2000 in woman aged 75 and over also supports the accumulation of disability in woman. In men, higher age group showed higher proportion of death in 2002, but it did not apply to the cases of institutionalization. This suggested the non-exponential pattern of increase of disability index median in men (Figure 6) was attributable to the death, but not to institutionalization.

Minor essential revisions
In the introduction, the association is presumed between the need for mild level care (grade 1) and mild disabilities. For a lay person in the Japanese care system, it is not clear when persons a eligible for care by the LTCI. Is the personal situation taken into account? For instance the presence of informal care?

Response: In response to this, one newly published reference is introduced and also new description of the LTCI eligibility test, which is based on the physical and mental status, is added. Suggested changes are incorporated in the background and reference section as follows.

Changes made to the manuscript
Background: page 4
This test is based on the physical and mental status, and it divides care needs into six categories or levels, based on the estimated amount of care resource utilization [2].

References

The descriptions of the TAI are in terms of Cannot (ability). This relates to the discussion if one
should measure ability or performance: Does not. What is observed with the TAI: ability or Performance?

**Response:**
This study classifies disability by performance according to the ICF taxonomy, in mobility, eating and toileting scales, because the evaluators were asked to measure the present situation in the measurement month. In other words, it is rather performance. However, TAI measures mental function not only by performance, but also by the function (according to the ICF). Therefore, the functional status measurement was used to define the measurement in this study, because the word “functional status measurement” encompassed both performance and function. Suggested changes are incorporated as follows. I thank the referee of noticing this problem.

**Changes made to the manuscript**
Method: page 7
The evaluators were asked to observe and classify the present status in the measurement month using TAI mobility, eating and toileting scales. In case of TAI mental status scale, the evaluators were asked to observe and also to interview relative functional status.

In the disability index, a summation is made of the scores (divided by 20). Three times a score of 1 (TAI level 4) is equal to severe. There is no distinction made between the different types of disabilities (mobility, eating, mental health, toileting). In the analysis section, elderly with a score of 0 are called independently, with a score of 0.05 and 0.10 are called mild disabled. This is a mix-up of two terms: dependency and disability: even a person with a mild disability can be independent. For instance: not able to climb stairs: if you have a same-level house, there is no need to climb stairs and you can live independently. So change the term independent into not disabled.

**Changes made to the manuscript**
Method: page 10 and Figure 7
“Independent” to “no disability”

In the results section, a distinction is made between age groups. I presume this is based on the age in 1996 (base line measurement). This should be made clear in the text.

**Changes made to the manuscript**
Method: page 9
“at base line” is added in page 9
Result: page 14
“base line” is added in page 12

In the paper figure 5 presents the flow of persons (and numbers) through the study. However, in table 1, 1200 persons are analyzed (number not in figure 5), with 433 dead (number not in figure 5) etc. This is very confusing and should be clarified.

Response:
The author agrees to clarify that 1200 cases were those who measured for consecutive 7 years of elders without disability (n=1560). If the entire elderly person whose measurement was performed in 1996 and 2002 is included, the number rises to 1273. 1273 is the sum of the survivors with no disability, mild disability and severe disability. However the result was the same. That is why it is repeated that the analysis using this 1273 and deceases cases (n=433). The flow of the subject (Figure 5) is corrected as suggested.

Changes made to the manuscript
Result: Figure 5 and page 10-11.
The flow of the subject (Figure 5) is corrected according to the suggestion.
The order of the sentences was changed to facilitate understanding of the flow of the sample.
Some numbers on the page 13 were also corrected.

In the discussion section, it is stated that the study was aimed at the identification of risk factors, but only chronic conditions (next to age and gender) were included in the analyses.

Changes made to the manuscript
Page 14, the paragraph was corrected as suggested.

In the discussion section, for the first time the term ADL disability is used. To what types of disability measured with the TAI is referred?

Response:
Toileting and Eating of the TAI scales contains ADL, while Mobility and Mental scales do not contain it. Therefore, the suggested changes were made as follows

Changes made to the manuscript
The author changed the “overall ADL disability” to “overall disability”.
This may be because of fine categorization in TAI definitions, as it classifies the elders who have problem to climb stairs into mild disability.
Reviewer #2 Howard Bergman

**Minor essential revision**

The author uses an instrument called TAI. There are several allusions to work on the validity of the TAI for the longitudinal study. This is neither well developed nor appropriate for this paper and should be deleted.

On Page 6 delete the last line of the paragraph longitudinal cohort study: “which is used to evaluate the predictive validity of the measure used in this study”. in other words delete:

On Page 7, the sentence begins with the “the cost of longitudinal studies collecting multiple data …”should be deleted. The following sentence beginning with “Therefore simplicity of the TAI is costadvantage”. Should be deleted as well. This has not been demonstrated or appropriate for this paper.

**Changes made to the manuscript**

**Method**: Page 6 and 7

Suggested changes were made to the manuscript.

On Page 18, delete the entire paragraph beginning with the sub title “validity of the TAI” for longitudinal study.

**Changes made to the manuscript**

**Discussion; page 18**

Suggested change was made to the manuscript.

Other minor changes:

2.1 On Page 6, under the sub-title: Measurement of disability, the first sentence should begin with the word the.

**Changes made to the manuscript**

**Method; page 6**

Suggested change was made to the manuscript.

2.2 In the next sentence which reads “Its reproducibility, construct validity and concurrent validity have been established in the previous study”: Replace “the previous study” by a previous study (Page 7)
Changes made to the manuscript
Method: page 6
Suggested change was made to the manuscript.

2.3 In the first line of the next paragraph replace “without” by not having any (Page 7)

Changes made to the manuscript
Method: page 7
Suggested change was made to the manuscript.

2.4 On Page 8, the long paragraph beginning with “Each item in the TAI has six hierarchical states…” this entire paragraph should be moved to page 7 after the first sentenced.

Changes made to the manuscript
Method: page 8
Suggested change was made to the manuscript (moved to page 6).

2.5 On Page 8, the 3rd line under the sub title “Retrospective questionnaire on chronic conditions”, the word “Remained” should be replaced by remaining

Changes made to the manuscript
Method: page 7
Suggested change was made to the manuscript.

2.6 On Page 9, the last line should read “describe the correlation of initial disability and future severity”

Changes made to the manuscript
Method: page 8
Suggested change was made to the manuscript.

2.7 On Page 14, under the sub-title “Prevalence and incidence of disability”, 4th line, the sentence beginning “Older age” should read “Older age had an effect on the rate of the disability development”.

Changes made to the manuscript
Result: page 12
Suggested change was made to the manuscript.

2.8 On Page 15, 3rd line, after the mention “Insert Fig. 7 about here”, the words “peculiar in” she be replace be particular to.

**Changes made to the manuscript**
Result: page 13
Suggested change was made to the manuscript.

2.9 On Page 16, 2nd line, after the mention “insert table 3 about here”, the word “Chronic” should be deleted.

**Changes made to the manuscript**
Result: page 13
Suggested change was made to the manuscript.

2.10 On Page 21, 2nd paragraph, 1st line, delete “such as cerebrovascular infarction”

**Changes made to the manuscript**
Discussion; page 21
Suggested change was made to the manuscript.