PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (Error! Hyperlink reference not valid.) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

TITLE (PROVISIONAL)	Self-rated health trajectory and frailty among community-dwelling older adults: evidence from the Taiwan Longitudinal Study on Aging (TLSA)
AUTHORS	Chu, Wei-Min; Ho, Hsin-En; Yeh, Chih-Jung; Hsiao, Yu-han; Hsu, Pi-Shan; Lee, Shu-Hsin; Lee, Meng-Chih

VERSION 1 – REVIEW

REVIEWER	Shaw, Richard University of Glasgow, Institute of Health and Wellbeing
REVIEW RETURNED	16-Feb-2021

GENERAL COMMENTS	This paper investigate the relationship between self-rated health and frailty in ~2000 adults from the Taiwan Longitudinal Study on Aging (TLSA). Self-rated health was operationalised using trajectories generated by “A group-based analysis model” and then the investigation of these trajectories was investigated using logistic regression. My biggest concern with this paper is the use of the trajectories. There are many different ways of generating trajectories (See Nguena Nguefack 2020) and the authors did not specify which approach they used. My own experience with methods used to generate trajectories is that different methods will produce different results. In addition the trajectories may not adequately describe all the variation in the indicator variables. The authors need to better describe how the trajectories were created in the methods section. This should include what method they used and how self-rated health was operationalized as indicators for the overall latent variable indicating the trajectory groups. The authors should state the specific method they used to generate the trajectories in the abstract, and justify why they are using trajectories in the background section. They should discuss the limitations of group based trajectories in the discussion section. Finally those limitations should be included in the strengths and limitations at the start of the study. I also found the discussion of causality in the paper problematic. On a technical level to demonstrate causality the authors should have included all potential confounders and there are important confounding factors excluded from the analysis including physical activity and depression. On a pragmatic level, I am not certain that inferring causality in studies like this is particularly helpful. The very strong associations are unlikely to be explained by residual confounding. However

	what that means is less clear. If poor health was not linked to frailty I would assume that there was something wrong with the model or data. Self-rated health is a very general marker of health. In part it will capture aspects of health and health behaviours not accounted by things measured in the model. Theoretically subjective perceptions of health could drive psychosocial processes that are detrimental and cause frailty. But to be convincing causal mechanism that would require much better measures of both health and health behaviours and include factors such as physical activity. In reality the relationship between frailty and self-reported health is probably bi-directional, and associations between two poorly defined measures of health are not particular interesting. I also think that the measure of frailty is somewhat problematic. I am concerned about the validity of using measures such as loss of appetite and carrying groceries as they do not appear that close a match to the Fried criteria, but acknowledge that to a degree this has already been indicated in the strengths and limitations section. The descriptions of some aspects of the study could be improved. Figures 1 and 2 would seem to indicate the self-rated health data is used for all of 1999, 2003 and 2007. However, this is not clear in the text. While the Strobe statement indicates that number of eligible participants at each stage of the study are described. This does not appear to be the case. I could not see any indication of how much attrition occurred between the waves, or how missing data was handled. This should be described in the text and / or added to figure 1. Other more minor matters On page 9 participants were classified as being employed or unemployed. Given the age group of the population many people in the sample would either be retired or acting as fulltime carers and it would not be appropriate to classify them as either employed or unemployed. The authors should state how they dealt with the sample design and used survey weights. If they were not accounted for this should be included in the limitations section. Reporting odds ratios and confidence intervals to three decimal places implies a level of precision that would require a much larger sample. It would be better to present the parameters to one or two decimal places. Reference Nguena Nguefack HL, Pagé MG, Katz J, Choinière M, Vanasse A, Dorais M, Samb OM, Lacasse A. Trajectory Modelling Techniques Useful to Epidemiological Research: A Comparative Narrative Review of Approaches. Clin Epidemiol. 2020;12:1205-1222

REVIEWER	Falk, Hanna Goteborgs universitet Sahlgrenska Akademin, Institute of Health and Care Sciences
REVIEW RETURNED	01-Mar-2021

GENERAL COMMENTS	General remarks;

	1) Please copyedit your manuscript text to correct grammatical and typographical errors. You can also ask a native English-speaking colleague to help you copy-edit the paper. If this is not possible, you may need to use a professional language editing service. 2) Change the wording; “elderly” to ”older” throughout your manuscript. Background; 3) Please provide a clear definition of self-rated health. As it reads now, it is unclear what you mean by “subjective feelings of their physical, psychological and social wellbeing combined with objective measures of health”. 4) Please provide a clear definition of pre-frailty. Method; 5) How did you address individuals with dementia? 6) Why did you exclude all participants with disability and how did you define disability? Having trouble bathing is not the same thing as being frail. In addition, there are evidence supporting that older adults with disability self-rates their health as good. How did you address this? 7) Please clarify your time-points. When did you ask your study participants about their SRH and all other self-rated information? 8) Please divide the text under “research variables” into suitable headlines. For example “demographics” and “health factors” etc. 9) You classified the individuals into three groups based on SRH: good (rated excellent or good), fair (fair), or poor (poor or very poor). Please state why. 10) Was information about chronic conditions ascertained by a positive answer to the question “have you ever been told by a doctor that you suffer from…” or did you review medical charts? 11) Please correct the Fried criteria. It should read (weight loss, exhaustion, low physical activity, slowness and weakness). 12) How many died during your follow-up period? Results; 13) You state that participants were divided into four groups. In the methods section you describe three groups. Please clarify or change wording so that it becomes evident that you talk about trajectories and not groups in your results section. 14) Did you check for any interaction effects? Women consistently report poorer SRH compared to men, for example. 15) Did you control for depression or dementia? These two important factors affect SRH in several studies. 16) Have you thought about the causality in the relationship between poor SRH and frailty beyond the fact that no one was considered frail at baseline? Please clarify. Discussion; 17) Some repetitions need rewriting. Please see my comment about copy-editing the text. 18) What do you mean by “the relationship between SRH and frailty is real under multifactorial mechanism”? Please clarify. 19) What do you mean by “we used serial SRH reports, though some participants may have experienced low SRH due to

	unidentified causes. For example, a subject may feel poor SRH due to health reasons". The main advantage of SRH is that it predict morbidity and mortality with great precision independent of known physical illness and other objective health measures. Please clarify. 20) What do you mean by "generalization of the results to other ethnic group should be made with caution"? Please clarify. 21) how did you adress attrition bias?

VERSION 1 – AUTHOR RESPONSE

Dr. Richard Shaw, University of Glasgow

1. My biggest concern with this paper is the use of the trajectories. There are many different ways of generating trajectories (See Nguena Nguefack 2020) and the authors did not specify which approach they used. My own experience with methods used to generate trajectories is that different methods will produce different results. In addition the trajectories may not adequately describe all the variation in the indicator variables. The authors need to better describe how the trajectories were created in the methods section. This should include what method they used and how self-rated health was operationalized as indicators for the overall latent variable indicating the trajectory groups. The authors should state the specific method they used to generate the trajectories in the abstract, and justify why they are using trajectories in the background section. They should discuss the limitations of group based trajectories in the discussion section. Finally those limitations should be included in the strengths and limitations at the start of the study.

Answer: Thank you for your comments and suggestions. We used Group-Based Trajectory Modelling (GBTM) for generating trajectories. GBTM is a finite mixture model and also a semi-parametric model for longitudinal data. We chose this model because it postulates discrete distribution of the population and thus makes it possible to distinguish, in the population, groups/classes of homogeneous individuals. We also employed the Bayesian Information Criterion to identify the most appropriate model groups. We hope to address this issue more carefully, thus from your comments and suggestions, we have revised our manuscript as follows:

A. In the paragraph of "statistical analysis", we described how the trajectories were created and how self-rated health was operationalized as indicators for generating trajectory groups, and added reference to show how our previous works address this issue.

B. In the paragraph of "limitations", we explained this limitation and added reference to show how our previous works address this issue and what need to be done in the future.

C. In abstract, we stated the specific method to generate the trajectories.

D. In introduction, we addressed the importance of SRH trajectory modelling and added reference to show how our previous works discussed this issue.

E. We very appreciate your concern and we want to make it more clear, so we have revised on page 3, line 13-14; page 7, line 13-15; page 11, line 10-18; page 16, line 21-25

2. I also found the discussion of causality in the paper problematic. On a technical level to demonstrate causality the authors should have included all potential confounders and there are important confounding factors excluded from the analysis including physical activity and depression.

On a pragmatic level, I am not certain that inferring causality in studies like this is particularly helpful. The very strong associations are unlikely to be explained by residual confounding. However what that means is less clear. If poor health was not linked to frailty I would assume that there was something wrong with the model or data. Self-rated health is a very general marker of health. In part it will capture aspects of health and health behaviours not accounted by things measured in the model. Theoretically subjective

perceptions of health could drive psychosocial processes that are detrimental and cause frailty. But to be convincing causal mechanism that would require much better measures of both health and health behaviours and include factors such as physical activity. In reality the relationship between frailty and self-reported health is probably bi-directional, and associations between two poorly defined measures of health are not particular interesting.
Answer: Thank you for your comments and suggestions. Just as you mentioned, the association of SRH and frailty could be bidirectional, especially in cross-sectional studies, but we believe that our longitudinal design is much stronger to interpret the causality. And to exclude those who developed frailty or disability initially was also for the purpose of causality. We hope to address this issue more carefully, thus from your comments and suggestions, we have revised our manuscript as follows:
A. In the paragraph of “limitations”, we explained those limitations and added reference to show how our previous works address this issue and what need to be done in the future.
B. We very appreciate your concern and we want to make it more clear, so we have revised on page 16, line 14-20.

3. I also think that the measure of frailty is somewhat problematic. I am concerned about the validity of using measures such as loss of appetite and carrying groceries as they do not appear that close a match to the Fried criteria, but acknowledge that to a degree this has already been indicated in the strengths and limitations section.
Answer: Thank you for your comments and suggestions. We used substitute evaluations for these five domains because we retrieved data from questionnaires, and this modified frailty definition have been used broadly and published before with validity. The references we put in our manuscript are as follows:
Ho HE, Yeh CJ, Chu WM, Lee MC. Midlife Body Mass Index Trajectory and Risk of Frailty 8 Years Later in Taiwan. The journal of nutrition, health & aging 2019; 23: 849-55.
de Vries NM, Staal JB, van Ravensberg CD, Hobbelen JS, Olde Rikkert MG, Nijhuis-van der Sanden MW. Outcome instruments to measure frailty: a systematic review. Ageing research reviews 2011; 10: 104-14.
Hsu HC, Chang WC. Trajectories of frailty and related factors of the older people in Taiwan. Experimental aging research 2015; 41: 104-14.
We hope to address this issue more carefully, thus from your comments and suggestions, we have revised our manuscript as follows:
A. In the paragraph of “methods”, we explained the definition of modified frailty index and demonstrated previous studies using this modified frailty index.
B. We very appreciate your concern and we want to make it more clear, so we have revised on page 10, line 10-13.

4. The descriptions of some aspects of the study could be improved. Figures 1 and 2 would seem to indicate the self-rated health data is used for all of 1999, 2003 and 2007. However, this is not clear in the text. While the Strobe statement indicates that number of eligible participants at each stage of the study are described. This does not appear to be the case. I could not see any indication of how much attrition occurred between the waves, or how missing data was handled. This should be described in the text and / or added to figure
Answer: Thank you for your comments and suggestions. For those who gone missing, we always hold response rate more than 85% in TLSA, and we believed that those few missed were equally distributed in different SRH categories. And, due to nearly all elderly approaching end-of-life have functional disability and frailty, we regarded those who deceased as having frailty in our study.
Covinsky KE, Eng C, Lui LY, Sands LP, Yaffe K. The last 2 years of life: functional trajectories of frail older people. J Am Geriatr Soc. 2003 Apr;51(4):492-8.

We still believe your suggestion is very important, thus from your comments and suggestions, we have revised our manuscript as follows:
A. In the paragraph of “results”, we addressed this issue more carefully and described our study protocol with more detail.
B. In the paragraph of “limitation”, we explained this limitation and mentioned how our efforts were made for preventing such bias.
C. We very appreciate your concern and we want to make it more clear, so we have revised on page 12, line 6-7 and page 17, line 7-10.

Other more minor matters
1. On page 9 participants were classified as being employed or unemployed. Given the age group of the population many people in the sample would either be retired or acting as fulltime carers and it would not be appropriate to classify them as either employed or unemployed.
Answer: Thank you for your comments and suggestions. For employment status in 1999, we divided the subjects into two groups: normally employed and unemployed. “Normally employed” was referred to as participants chose the answer of “ I had a job whether it was fulltime or par time job” or “I had a job but took a leave temporarily.”; “Unemployed” was referred to as participants chose the answer of “I had no job and was looking for a job.” or “I did not doing any job.”
Chu WM, Ho HE, Yeh CJ, Tsan YT, Lee SH, Lee MC. Late-career unemployment and risk of frailty among older adults in Taiwan: An 8-year population-based cohort study. Geriatr Gerontol Int. 2021 Apr;21(4):353-358.
We still believe your suggestion is very important, thus from your comments and suggestions, we have revised our manuscript as follows:
A. In the paragraph of “methods”, we addressed this issue more carefully, described our definition of variables with more detail and added references.
B. We very appreciate your concern and we want to make it more clear, so we have revised on page 9, line 23-25 and page 10, line 1-2.

2. The authors should state how they dealt with the sample design and used survey weights. If they were not accounted for this should be included in the limitations section.
Answer: Thank you for your comments and suggestions. In TLSA, a three-stage systematic random sampling design was used for the selection of an equal probability sample. The first stage sample was drawn from 331 townships, which were stratified by administrative level, three levels of education, and three levels of total fertility rate into 27 strata of roughly equal size. For the second stage, blocks in selected townships, which served as clusters, were selected with probabilities proportional to their size by cumulation of the population. Systemic random sampling was made with the interval of selection equal to the size each selected township divided by the number of blocks. We believe that TLSA hold high sample representative and revealed true population structure under this kind of sampling method.
Tai CJ, Chen JH, Tseng TG, Lin YT, Hsiao YH, Lee MC, Yang YH. Prediction of Frailty and Dementia Using Oral Health Impact Profile from a Population-Based Survey. Int J Environ Res Public Health. 2020 Mar 18;17(6):1997.
We still believe your suggestion is very important, thus from your comments and suggestions, we have revised our manuscript as follows:
A. In the paragraph of “methods”, we described our study protocol with more detail and added related reference.
B. We very appreciate your concern and we want to make it more clear, so we have revised on page 8, line 7-8

3. Reporting odds ratios and confidence intervals to three decimal places implies a level of precision that would require a much larger sample. It would be better to present the parameters to one or two decimal places.
Answer: Thank you for your comments and suggestions. We adjusted our manuscript and presented the parameter with two decimal places.

Reference
Nguena Nguefack HL, Pagé MG, Katz J, Choinière M, Vanasse A, Dorais M, Samb OM, Lacasse A. Trajectory Modelling Techniques Useful to Epidemiological Research: A Comparative Narrative Review of Approaches. Clin Epidemiol. 2020;12:1205-1222

Reviewer: 2
Dr. Hanna Falk, Goteborgs universitet Sahlgrenska Akademin

Comments to the Author:
General remarks;
1) Please copyedit your manuscript text to correct grammatical and typographical errors. You can also ask a native English-speaking colleague to help you copy-edit the paper. If this is not possible, you may need to use a professional language editing service.
Answer: Thank you for your comments and suggestions. We've reviewed our manuscript once again and also we used a professional language editing service to help dealing with grammatical and typographical errors.

2) Change the wording; "elderly" to "older" throughout your manuscript.
Answer: Thank you for your comments and suggestions. We've revised our manuscript and changed the wording.

3) Please provide a clear definition of self-rated health. As it reads now, it is unclear what you mean by "subjective feelings of their physical, psychological and social wellbeing combined with objective measures of health".
Answer: Thank you for your comments and suggestions. Self-rated health (also called Self-reported health, Self-assessed health, or perceived health) refers to a single question such as "in general, would you say that your health is excellent, very good, good, fair, or poor?" In our study, SRH was determined by asking individuals how they rated their current health. Possible answers were excellent, good, fair, poor, and very poor. We reclassified the individuals into three groups based on SRH: good (rated excellent or good), fair (fair), or poor (poor or very poor).
Idler EL, Benyamini Y. Self-rated health and mortality: a review of twenty-seven community studies. J Health Soc Behav. 1997 Mar;38(1):21-37.
We still believe your suggestion is very important, thus from your comments and suggestions, we have revised our manuscript as follows:
A. In the paragraph of "background", we described SRH with more detail and added related reference.
B. In the paragraph of "methods", we described SRH definition in our study with more detail.
C. We very appreciate your concern and we want to make it more clear, so we have revised on page 6, line 12-14 and page 9, line 17-20.

4) Please provide a clear definition of pre-frailty.
Answer: Thank you for your comments and suggestions. Frailty is a geriatric condition characterized by increased vulnerability and decreased capacity to maintain homeostasis, and pre-frailty refers to when one or two of the elements of the Fried frailty phenotype are detected.

Gordon SJ, Baker N, Kidd M, Maeder A, Grimmer KA. Pre-frailty factors in community-dwelling 40-75 year olds: opportunities for successful ageing. BMC Geriatr. 2020 Mar 6;20(1):96.
We still believe your suggestion is very important, thus from your comments and suggestions, we have revised our manuscript as follows:
A. In the paragraph of “background”, we illustrated the definition of pre-frailty and added related reference.
B. In the paragraph of “methods”, we described pre-frailty definition in our study with more detail.
C. We very appreciate your concern and we want to make it more clear, so we have revised on page 7, line 2-4 and page 10, line 10-13.

Method;
5) How did you address individuals with dementia?
Answer: Thank you for your comments and suggestions. We did used subjective assessment for variables such as self-rated health or income level, and such subjective assessment could be influenced by mood states or cognitive function such as depression. We believe that future study needs to explore the relationship between SRH, dementia and frailty. We hope to address this issue more carefully, thus from your comments and suggestions, we have revised our manuscript as follows:
A. In the paragraph of “limitations”, we explained this limitation and address this issue and what need to be done in the future.
B. We very appreciate your concern and we want to make it more clear, so we have revised on page 17, line 1-4.

6) Why did you exclude all participants with disability and how did you define disability? Having trouble bathing is not the same thing as being frail. In addition, there are evidence supporting that older adults with disability self-rates their health as good. How did you address this?
Answer: Thank you for your comments and suggestions. Functional disability was ascertained if participants had trouble with at least one activity of daily living, including bathing, dressing, eating, getting out of bed, walking, and using the bathroom. We excluded people with frailty and/or disability at baseline, as both frailty and/or disability could substantially affect the outcome.
We believe your suggestion is very important, thus from your comments and suggestions, we have revised our manuscript as follows:
A. In the paragraph of “methods”, we explained the definition of functional disability and added related reference.
B. We very appreciate your concern and we want to make it more clear, so we have revised on page 8, line 25 and page 9, line 1-2.

7) Please clarify your time-points. When did you ask your study participants about their SRH and all other self-rated information?
Answer: Thank you for your comments and suggestions. For each eligible subject, we gathered data in 1999 on age, gender, level of education, marital status, income level, social participation, employment status, smoking, alcohol consumption, and chronic diseases. We gathered data of SRH in 1999, 2003 and 2007. We believe your suggestion is very important, thus from your comments and suggestions, we have revised our manuscript as follows:
A. In the paragraph of “methods”, we explained the time which data was gathered specifically.
B. We very appreciate your concern and we want to make it more clear, so we have revised on page 9, line 7-9.

8) Please divide the text under “research variables” into suitable headlines. For example “demographics” and “health factors” etc.

Answer: Thank you for your good suggestions, we have revised our manuscript and added three sub-headlines, including demographics, health factors and outcome.

9) You classified the individuals into three groups based on SRH: good (rated excellent or good), fair (fair), or poor (poor or very poor). Please state why.
Answer: Thank you for your comments, we regrouped SRH from 5 groups to 3 groups because it's more complicated to deal with 5 groups statistically. Also the number of participants in each group was fewer if we have 5 groups instead, which could lead to less power.

10) Was information about chronic conditions ascertained by a positive answer to the question "have you ever been told by a doctor that you suffer from…" or did you review medical charts?
Answer: Thank you for your comments, information about chronic conditions was ascertained by a positive answer to the question "have you ever been told by a doctor that you suffer from…". We believe your suggestion is very important, thus from your comments and suggestions, we have revised our manuscript as follows:
A. In the paragraph of "methods", we explained the definition of diagnosis of chronic disease more specifically.
B. We very appreciate your concern and we want to make it more clear, so we have revised on page 10, line 5-7.

11) Please correct the Fried criteria. It should read (weight loss, exhaustion, low physical activity, slowness and weakness).
Answer: Thank you for your comments and suggestions, we've revised our manuscript. We believe your suggestion is very important, thus from your comments and suggestions, we have revised our manuscript as follows:
A. In the paragraph of "methods", we addressed this issue with correction of Fried criteria.
B. We very appreciate your concern and we want to make it more clear, so we have revised on page 10, line 10-13.

12) How many died during your follow-up period?
Answer: Thank you for your comments and suggestions. Loss of follow up and deceased participants could affect the study results. For those who gone missing, we always hold response rate more than 85% in TLSA, and we believed that those few missed were equally distributed in different SRH categories. Due to nearly all elderly approaching end-of-life have functional disability and frailty, we regarded those who deceased as having frailty in our study.
Covinsky KE, Eng C, Lui LY, Sands LP, Yaffe K. The last 2 years of life: functional trajectories of frail older people. J Am Geriatr Soc. 2003 Apr;51(4):492-8.
We still believe your suggestion is very important, thus from your comments and suggestions, we have revised our manuscript as follows:
A. In the paragraph of "methods", we addressed this issue more carefully.
B. In the paragraph of "limitation", we explained this limitation and mentioned how our efforts were made for preventing such bias.
C. We very appreciate your concern and we want to make it more clear, so we have revised on page 11, line 5-7 and page 17, line 7-10.

Results;
13) You state that participants were divided into four groups. In the methods section you describe three groups. Please clarify or change wording so that it becomes evident that you talk about trajectories and not groups in your results section.

Answer: Thank you for your comments and suggestions. We used the three groups based on SRH: good (rated excellent or good), fair (fair), or poor (poor or very poor) as indicators to generate the model and employed the Bayesian Information Criterion to identify the most appropriate model groups in group-based trajectory modelling (GBTM). After GBTM was applied, 4 trajectories of SRH was generated from 1999 to 2007.
We hope to address this issue more carefully, thus from your comments and suggestions, we have revised our manuscript as follows:
A. In the paragraph of “statistical analysis”, we described how the trajectories were created and how self-rated health was operationalized as indicators for generating trajectory groups, and added reference to show how our previous works address this issue.
B. We very appreciate your concern and we want to make it more clear, so we have revised on page 11, line 10-18.

14) Did you check for any interaction effects? Women consistently report poorer SRH compared to men, for example.
Answer: Thank you for your comments and suggestions. Actually, it become more sophisticated when interaction effects were considered. We will explore it in the future study. We still believe your suggestion is very important, thus from your comments and suggestions, we have revised our manuscript as follows:
A. In the paragraph of “limitation”, we explained this limitation and mentioned how our efforts should be done in the future study.
B. We very appreciate your concern and we want to make it more clear, so we have revised on page 17, line 4-7.

15) Did you control for depression or dementia? These two important factors affect SRH in several studies.
Answer: Thank you for your comments and suggestions. We did used subjective assessment for variables such as self-rated health or income level, and such subjective assessment could be influenced by mood states or cognitive function such as depression. We hope to address this issue more carefully, thus from your comments and suggestions, we have revised our manuscript as follows:
A. In the paragraph of “limitations”, we explained this limitation and address this issue and what need to be done in the future.
B. We very appreciate your concern and we want to make it more clear, so we have revised on page 16, line 25 and page 17, line 1-4.

16) Have you thought about the causality in the relationship between poor SRH and frailty beyond the fact that no one was considered frail at baseline? Please clarify.
Answer: Thank you for your comments and suggestions. The association of SRH and frailty could be bidirectional, especially in cross-sectional studies, but we believe that our longitudinal design is much stronger to interpret the causality. And also we exclude those who developed frailty or disability initially for the purpose of causality. We hope to address this issue more carefully, thus from your comments and suggestions, we have revised our manuscript as follows:
A. In the paragraph of “limitations”, we explained those limitations and added reference to show how our previous works address this issue and what need to be done in the future.
B. We very appreciate your concern and we want to make it more clear, so we have revised on page 16, line 14-20.

Discussion;
17) Some repetitions need rewriting. Please see my comment about copy-editing the text.

Answer: Thank you for your comments and suggestions. We've reviewed our manuscript once again and also we used a professional language editing service to help dealing with grammatical and typographical errors.

18) What do you mean by "the relationship between SRH and frailty is real under multifactorial mechanism"? Please clarify.
Answer: Thank you for your comments and suggestions. We wanted to summarize those previous studies of SRH and frailty thus we had the conclusion. But after careful discussion, we've decided to delete the sentence in the manuscript.

19) What do you mean by "we used serial SRH reports, though some participants may have experienced low SRH due to unidentified causes. For example, a subject may feel poor SRH due to health reasons". The main advantage of SRH is that it predict morbidity and mortality with great precision independent of known physical illness and other objective health measures. Please clarify.
Answer: Thank you for your comments and suggestions. After discussion, we've decided to delete the sentence in the manuscript to make it more clear. We hope to address this issue more carefully, thus from your comments and suggestions, we have revised our manuscript as follows:
A. In the paragraph of "limitations", we explained this limitation of the possible bi-directional interaction of SRH and frailty
B. We very appreciate your concern and we want to make it more clear, so we have revised on page 16, line 14-20.

20) What do you mean by "generalization of the results to other ethnic group should be made with caution"? Please clarify.
Answer: Thank you for your comments and suggestions. Because the study was performed in Taiwan with Taiwanese participants, we suggested that generalization of the results to other ethnic group, such as Caucasians or African Americans, should be made with caution. But after discussion, we've decided to delete the sentence in the manuscript.

21) how did you address attrition bias?
Answer: Thank you for your comments and suggestions. For those who gone missing, we always hold response rate more than 85% in TLSA, and we believed that those few missed were equally distributed in different SRH categories. And, due to nearly all elderly approaching end-of-life have functional disability and frailty, we regarded those who deceased as having frailty in our study.
Covinsky KE, Eng C, Lui LY, Sands LP, Yaffe K. The last 2 years of life: functional trajectories of frail older people. J Am Geriatr Soc. 2003 Apr;51(4):492-8.
We still believe your suggestion is very important, thus from your comments and suggestions, we have revised our manuscript as follows:
A. In the paragraph of "methods", we addressed this issue more carefully.
B. In the paragraph of "limitation", we explained this limitation and mentioned how our efforts were made for preventing such bias.
C. We very appreciate your concern and we want to make it more clear, so we have revised on page 11, line 5-7 and page 17, line 7-10.

VERSION 2 – REVIEW

REVIEWER	Shaw, Richard University of Glasgow, Institute of Health and Wellbeing
REVIEW RETURNED	28-May-2021

GENERAL COMMENTS	The authors have done a good job at addressing most of my points. In particular, they have improved the way in which they describe how the group based trajectories were created. However, the rationale for using them could be improved further. Stating that "More and more researchers used trajectories of SRH as indicators to explore the change of SRH through time and its consequences" does not actually provide an actual theoretical justification of why these methods are being used in the study. Note also that reference 25 operationalises trajectories using a different methodological approach which does not seem particularly relevant to the one the authors are using. ¶ I would also like to thank the authors for acknowledging that loss to follow up could be a source of bias on page 17, line 7. However, the subsequent sentence "However, our study used a prospective design and a nationally representative sample, which should have compensated for this limitation," Should be deleted. Methods such as non-response weights or imputation are required to compensate for attrition. ¶ On page 9. The authors could still be more accurate about their definitions for employment and non-employment. Unemployment is nested within other non-employment states, see for example (Erlinghagen and Knuth 2010), other states include being retired or looking after a home. Most definitions of unemployment only include people who are economically active and looking for work and this is not the case with the definition the authors use. ¶ Finally, I thank the authors for revising the tables so that odds ratios and confidence intervals are now only shown to two decimal places. To be consistent the odds ratios and confidence intervals in the abstract should also be changed.

VERSION 2 – AUTHOR RESPONSE

Reviewer: 1

Dr. Richard Shaw, University of Glasgow

Answer: Thank you for your comments and suggestions, we've removed reference 25 and added new reference as follows:

Nagin DS, Odgers CL. Group-based trajectory modeling in clinical research. Annu Rev Clin Psychol. 2010;6:109-38.:

Also, we rewrite this part with more emphasis on the problem we met in long-term observational research among older adults and why we used GBTM.

A. We very appreciate your concern and we want to make it more clear, so we have revised on page 6, line 6-10.

I would also like to thank the authors for acknowledging that loss to follow up could be a source of bias on page 17, line 7. However, the subsequent sentence “However, our study used a prospective design and a nationally representative sample, which should have compensated for this limitation,” Should be deleted. Methods such as non-response weights or imputation are required to compensate for attrition.

Answer: Thank you for your comments and suggestions. We have removed the statement.

On page 9. The authors could still be more accurate about their definitions for employment and non-employment. Unemployment is nested within other non-employment states, see for example (Erlinghagen and Knuth 2010), other states include being retired or looking after a home. Most definitions of unemployment only include people who are economically active and looking for work and this is not the case with the definition the authors use.

Answer: Thank you for your comments and suggestions. It is true that phrases of “Employment” and “Unemployment” could lead to misunderstanding. In order to make it more clear, we switched the wording from “Employment” and “Unemployment” to “With a job” and “Without job”. We also rephrased “Employment status” to “Job status”. We still believe your suggestion is very important, thus from your comments and suggestions, we have revised our manuscript as follows:

A. We very appreciate your concern and we want to make it more clear, so we have revised on page 9, line 3-6.

Finally, I thank the authors for revising the tables so that odds ratios and confidence intervals are now only shown to two decimal places. To be consistent the odds ratios and confidence intervals in the abstract should also be changed.

Answer: Thank you for your comments and suggestions. We’ve changed the odds ratios and confidence intervals to two decimal places in the abstract.

Reviewer: 1

Competing interests of Reviewer: None

VERSION 3 – REVIEW

REVIEWER	Shaw, Richard University of Glasgow, Institute of Health and Wellbeing
REVIEW RETURNED	15-Jul-2021

GENERAL COMMENTS	The authors have responded satisfactorily to my comments. Looking through the remaining paper I would like to check whether or not the authors intended to include “[thumb print? fingerprint?]” in the ethical approval section at line 18 on page 20, as it may have been added by a proof reader.