Author’s response to reviews

Title: Hand-Grip Strength Among Older Adults In Singapore: A Comparison With International Norms And Associative Factors

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Professor Ian Cameron
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Title: Hand-grip strength among older adults in Singapore: a comparison with international norms and associative factors
Dear Professor Ian Cameron,

Thank you for your email and we would like to thank both reviewers, Dr. Richard W. Bohannon and Dr. Gareth Jones, for their time and thoughtful comments to improve the quality of our manuscript. Our response is as follows (highlighted in bold for easy reference):

Comments from the reviewers:

Richard W. Bohannon (Reviewer 1):

1) I don't think the authors' purpose was to "examine the normative values." Rather, I believe it was to "establish" them.

Reply:

We have made changes to the text as suggested by the reviewer (Abstract-background). The word “examine” was removed and changed to “establish”.

2) There are problems with expression throughout the paper. In the Abstract for example:

Relationships are not performed. "Greater height and weight"…..are

Reply:

We have made changes to the text as suggested by the reviewer (Abstract-methods & conclusions). “Relationships …were performed” was changed to “Relationships…were examined”. “Greater height and weight…is”…was changed to “are”. 
3) I wouldn't say hand grip strength is associated with frailty and sarcopenia. I'd say it is used to help identify frailty and sarcopenia.

Reply:

We agree with the reviewer’s comment and have made the changes. “…associated with” was removed and changed to “used to help identify” as suggested by the reviewer (Pg 3 line 6).

4) If a numbering system is used for references in the text, the listing of all authors is not necessary.

Reply:

We made amendments to all the citations. If there are 2 or more authors, we have listed only the first author by last name and abbreviated with et al. (e.g. Dodds et al.) (Pg 3 line 14).

5) Phrases such as "In a recent paper by…” are seldom warranted. They make for wordiness. Just write "Malhotra et al recently published normative values for grip strength using data obtained in the Social….

Reply:

We have made changes to the text as suggested by the reviewer (Pg 4 line 47). “In a recent paper by…” was removed to “Malhotra et al. [6] recently published normative values for HGS using data obtained from the national Social …”
6) "Upper arm circumference" is a misnomer as the arm (brachium) in the upper limb between the shoulder and elbow. The phrase "mid-arm circumference" is more appropriate.

Reply:

We decided to use the term “Upper arm circumference” as it has been used in other studies [1, 2] and furthermore the measurements taken in those studies were similar to ours where only the thickest part of the upper arm was measured rather than the mid-part of the arm.

7) The authors’ measurements of arm and waist circumference are not conventional.

Reply:

We have added a reference for the physical and neurological assessment that our study used, the NEUROEX, [3] and recent studies to support our measurements’ of upper arm [2] and waist circumference [1] (Pg 6 line 137). These studies used similar methods to measure upper arm and waist circumference.

8) The proper term is "Hand-grip dynamometer." Hand-held dynamometers are held by an examiner and applied to a patient.

Reply:

We have made changes to the text as suggested by the reviewer. Under Discussion-Comparison with other countries-> 3rd paragraph, “hand-held dynamometer” was changed to “hand-grip dynamometer” (Pg 14 line 327).
9) I'm not sure as to Journal style, but in the References some journal titles are written out and some are abbreviated. Also, some article titles are capitalized while others are not.

Reply:
We have checked through all the citations and ensure the journal and article titles are consistent as suggested by the reviewer.

Gareth Jones (Reviewer 2):

Primary comments:

1) Handgrip strength is a biological 'sex' variable. Therefore, throughout your manuscript you need to correct for gender (men and women), which now become sex (males and females). For example, Paragraph 3 in the abstract …regression analysis was stratified for gender significant associations…this now becomes … regression analysis was stratified for sex significant associations. All these associations - age, height, upper arm circumference are all sex-related. Paragraph 4 in the abstract …HGS in women but not in male…now becomes…HGS in females but not in males. However, you do speak to gender related variables within the discussion …line 203 'occupation' …in this case you are correct to speak about men and women; however, you should delineate that you have moved from a sex-based discussion to gender.

Reply:
We have corrected for all gender (men and women) to sex (males and females) as suggested by reviewer (excluding line 203 [now line 290] ‘occupation’ where we have used men and women and the sociodemographic table).

2) You need to explain in the introduction why the addition of upper extremity and comparison to Western values makes your study unique compared to earlier investigations.
In page 4 line 49 we mentioned that although Malhotra et al. [4] published normative values for HGS recently, no other studies including theirs have made comparisons of how Singapore older adults performed for HGS compared to other Western and Asian countries. Furthermore, other anthropometric measurements such as arm and waist circumference were also shown to correlate with HGS [5, 6] but were not examined by Malhotra et al. [4].

3) Study participants - explain how participants selected. Were randomly selected or was this a sample of convenience? Line 66 - explain clearly, who the informant was. Was this a 'proxy' participant in that they completed the survey for the participant?

Reply:

We have included the description (i.e. how participants were selected and approached) under methods-study participants as suggested by the reviewer (Pg 5 line 89).

In the same paragraph, we have added a sentence to explain who the informant was (i.e. someone who knew the participant best) and informant can be either caregivers, co-residents or someone who has close contact with the older person but not involved in a caregiving role. Informants were only involved in the survey when the participant (older adult) could not provide information, such as questions on “participant background information”, “services use”, and “physical health condition” (Pg 6 line 119). A detailed description of the instruments administered to the informant can be found in an earlier paper by Subramaniam et al. [7].

4) How was hand dominance determined? Edinburgh scale?

Reply:

We have added the information to the text as suggested by the reviewer (Pg 6 line 125). Hand dominance was determined by asking the participant which hand they use for writing and if participant was illiterate, the interviewer would ask which hand they would predominantly use when performing a task.
5) You need to fully describe the type of muscle contraction being performed 'isometric' and explain how participants should exhale their breath to prevent increased thoracic pressure during the test.

Reply:
We have added the information on “isometric muscle contractions” to the text as suggested by the reviewer (Pg 6 line 129). The interviewers did not give any instruction to the participants regarding exhalation of their breath during the test. According to the Jamar Plus Hand Dynamometer Instruction Manual, after the patient’s palm fits comfortably on the JAMAR PLUS+ device, they just have to squeeze the grip for each trial [8].

6) If the HGS assessment performed in while seated, as per the ASHT suggests. Then this assessment is not a test of overall body strength, as the arms and trunk not engaged during the maneuver. Higher strength values gained while standing.

Reply:
We agree with the reviewer’s comment. In this study, the assessment is only on gripping strength and not a test of overall body strength. We have made changes to the abstract (background-first sentence). “Hand-grip strength (HGS) serves as a proxy measure for muscle strength” was changed to “…muscle function”. The HGS assessment was followed strictly to the ASHT recommendation for HGS [9].

7) Explain how the arm circumference was determine. Speak to arm position.

Reply:
We have added an explanation to the text as suggested by the reviewer (Pg 7 line 145). Upper arm circumference was determined by the dominant hand where participants were instructed to have their shoulders relaxed and both arms hanging loosely at the sides as flexing or tightening the arm muscle will result an inaccurate measurement.
8) Pg 6 line 82 you suggest a structure physical and neurological assessment. Please explain what the neurological component of this assessment.

Reply:

We have added the name of the assessment and a new reference to the text [3] (Pg 6 line 137). The NEUROEX is a brief fully structured physical and neurological assessment with objectified measures of anthropometric measurements. Since the aim of the study was not related to the neurological component, thus it was not stated in the text.

9) Provide rationale for leaving the last group 85+. What was the maximum age (105 years)? Every other age group is in 5-year intervals while the oldest and arguably the most heterogeneous is likely more than a 5-year interval based-on your standard deviations. How might you account for your sample size in the 85+ group actually representing that group of older adults?

Reply:

We agree with the reviewer’s concern as the last group 85+ of the sample was not reported in 5-year interval which may bias the generalization findings for this specific group. We decided to combine those aged 85 years and above as single group because the numbers of participants within this group especially those aged 90 years and above were very low. For example if we separated this group into three group as in 5-year interval i.e. 85-89 (n=134), 90-94 (n=31), 95-99 (n=6) and 100-105 (n=1), we have insufficient number to perform statistical analyses separately by gender, examine socio-demographics correlates of hand-grip strength and its association with other anthropometric measures.

10) On page 8 line 110-115; account for how this distribution across age and ethnicity represents the actual population of Singapore.
In our study, the distribution of age and ethnicity were designed to represent the actual population of Singapore. In order to achieve this aim, we have computed survey weights that incorporate sampling weight, non-response weight and post-stratification weight which was used to weigh the sample back to the population to adjust for oversampling, non-response and post-stratify by age and ethnicity distributions between the survey sample and the Singapore elderly population. This approach has been recommended when analysing complex survey data [10]. We have added this information in our revised method.

11) Why was your study better than the Malhotra et al. study? Results are the same? What really makes your study unique and worth publishing?

Reply:

In Malhotra et al. [4] study, the researchers looked at only the normative HGS data of elderly Singaporeans aged 60 years and older and the socio-demographic characteristics that influence these normative HGS values. Although our results are similar to theirs (for the HGS normative values), in our study, more analysis and discussion was added to compare Singapore older adults’ HGS performance with neighbouring countries such as Malaysia, other Asian countries (i.e. Hong Kong, Japan, Taiwan), and also Western countries (i.e. US and UK).

Furthermore, other than examining the anthropometric correlates of HGS in our study (which was not conducted in Malhotra et al. [4]), we conducted stratified regression analysis and found interesting results (i.e. sex differences) where only upper arm circumference were significantly associated with HGS in males but not in females and waist circumference were significantly associated with HGS in females and not in males. This result is unique and further studies could look into this area of research.

12) Pg 15 line 278 you mention 'palm size' but never mentioned this before
Reply:

We have removed ‘palm size’ from page 15 line 367 since it was not mentioned and analysed in our study as mentioned by the reviewer.

Secondary comments:

Pg 1 line 20 (add semi-colon)...stratified by; 5-year... Pg 1 line 21 (change gender to sex)...groups, sex, and ethnicity.

Reply: We have made changes by adding the semi-colon and change gender to sex to the text as suggested by the reviewer.

Pg 1 line 24 (remove 'a')...using multiple linear regression... Pg 1 line 29 (change sentence)...The mean HGS demonstrate a decreasing tend with increased age across all ethnic groups and sexes.

Reply: We have made the changes to the text as suggested by the reviewer.

Pg 1 line 33 (remove 'those of' and 'those) ...Males in the youngest age group (60-64) and of Chinese...

Reply: We have made the changes to the text as suggested by the reviewer.

P1 line 34 (add 'values')...greater HGS values than their...

Reply: We have made the changes to the text as suggested by the reviewer.

P1 line 35 (change gender to sex)...stratified for sex, significant...

Reply: We have made the changes to the text as suggested by the reviewer.
HGS in females but not males.

Reply: We have made the changes to the text as suggested by the reviewer.

older adults in Singapore.

Reply: We have made the changes to the text as suggested by the reviewer.

HGS in older adults.

Reply: We have made the changes to the text as suggested by the reviewer.

stratified data into age and sex…Pg 2 line 20 (change gender to sex) …data by sex…Pg 3 line 23 (change author reference style)…Auyeung and colleagues [2] Pg 3 line 24 (change gender to sex, women to female) ….the sex differences….that females had a…Pg 3 line 35 (no capital letter on Others)….and others (3.2%) [22].

Reply: We have made the changes to the text as suggested by the reviewer.

total Singapore population [22].

Reply: We have made the changes to the text as suggested by the reviewer.

In a recent paper by Malhotra et al., [6] Pg 3 line 41 (remove 'Singapore' and 'survey' and 'namely') …using data from the national Social Isolation, Health and Lifestyles Survey (SIHLS).

Reply: We have changed the reference style and the sentence as suggested by the reviewer (Pg 4 line 47).

However, this study only assessed the sociodemographic correlates of HGS such as age, sex, ethnicity, education level and occupation, but did not account for anthropometric correlates of HGS such as, upper arm and waist circumference. Both correlate with HGS [18, 19].
Reply: We have made the changes to the sentence in the text as suggested by the reviewer (Pg 4 line 51).

Pg 5 line 50-55 - You need to use proper punctuation (i.e. colon - because you present a list of 4 aims) and each aim should be separated by a semi-colon and the first word in the aim should be capitalized.

The current study aimed to: (1) Establish……ethnicity; (2) Compare Singapore….countries; (3) Examine sociodemographic….and; (4) Explore the relationship…..

Reply: We have added the colon, semi-colon, and capitalized the first word for each aim in the text as suggested by the reviewer.

Pg 6 line 75 - Appropriately reference the handgrip dynamometer …Name (City, Country) Pg 6 line 87 change women to females and men to males.

Reply: We have added the handgrip dynamometer details to the text and made the changes from gender to sex as suggested by the reviewer (Pg 6 line 128).

Pg 7 line 92 explain the 10/66 diagnostic criteria.

Reply: We have added a reference Prince et al. [11] to explain the 10/66 diagnostic criteria (Pg 7 line 154).

Pg 8 line 122 (change gender to sex)

Reply: We have made the changes to the text as suggested by the reviewer.

Pg 8 line 128 changes men to males and women to females. Age is a sex-variable not a gender variable.

Reply: We have made the changes to the text as suggested by the reviewer.
Pg 11 Line 177 to 179 - this comparison between women and men (should be females and males) does not clarify if this is a younger or older population.

Reply: We have changed “women and men” to “females and males” and clarified that this comparison is between the younger males and females (Pg 11 line 254).

Pg 11 Line 181. Start new paragraph, you start a new idea regarding ethnic differences … Few have looked… Pg 13 line 234. Need a reference to support this statement about nutrition and genetic factors.

Reply: We have started a new paragraph for the ethnic differences as suggested by the reviewer (Pg 11 line 258). We also added a new reference to support the statement on the role of nutrition and genetic factors on anthropometric measurements among countries [12] (Pg 13 line 323).

We hope our revisions are acceptable and we look forward to a favourable decision.

Thank You

Sincerely,

Hui Lin Ong
Research Division
Institute of Mental Health
Singapore
References


5. Yun YD, Jeong YA, Min JH, Yoo KT, Choi JH. Analysis on the change of hand grip strength as per the circumference of upper arm and forearm and the muscle activity of upper arm and forearm as per the duration of gripping. Journal of International Academy of Physical Therapy Research. 2013;4:532.


