Author’s response to reviews

Title: A secondary analysis examining the concordance of self-perception of weight and actual measurement of body fat percentage: The CRONICAS Cohort Study

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Author’s response to reviews:

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James Mockridge, PhD
Editor in Chief
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Dear Dr. Mockridge,

Please consider our manuscript, now entitled “A secondary analysis examining the concordance of self-perception of weight and actual measurement of body fat percentage: The CRONICAS Cohort Study” for publication in BMC Obesity.

We appreciate the comments that your team and the peer-reviewers have provided, which have helped us improve our messaging and clarity. We have responded and made modifications to our manuscript, and detail our responses line by line in the subsequent pages. Thank you very much for this helpful feedback.
We present original research from the CRONICAS Cohort to measure agreement between self-perceptions of weight and percent body fat, as measured by bioelectric impedance analysis (BIA) among a cohort of 3181 Peruvian adults. We take advantage of our cohort data and utilize longitudinal methods to quantify the variation in body fat over time depending upon both baseline self-perceptions of weight and whether a participant underestimate their weight status.

While there has been existing research studying self-perceptions of weight on other metrics, such as body mass index, few studies have uncovered the relationship between self-perceptions and BIA. Furthermore, we hope to add to the literature by using a unique cohort from Peru, an upper middle-income country with major socioeconomic heterogeneities and a diversity of geographies that was used in this study.

In our study, we find that half of our study participants are overweight or obese, and that self-perceptions of weight poorly agree with BIA-measured body fat. In particular, half of participants underestimate their weight status when compared to BIA-measured body fat. Furthermore, we find that after controlling for socioeconomic and demographic covariates, those who underestimate their weight status tend to have more body fat than those who do not. We believe this work is an important step to understanding the patterns of weight self-perceptions. Importantly, it highlights large variation in self-perceptions of weight. Because of this, we believe further research is necessary in investigating the clinical and public health significance of utilizing self-perceptions of weight in interventions addressing the obesity epidemic.

Neither this manuscript nor related papers have been published previously or are under review at any other journal. All authors have read the paper and approved its submission. No author has a conflict of interest regarding the analysis or results of this paper. Thank you for considering our manuscript. We look forward to your response. If you have any questions or concerns, please do not hesitate to contact me.

Sincerely,

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AUTHORS’ RESPONSES TO REVIEWER COMMENTS FROM BMC Obesity SUBMISSION

Reviewer 1
Thank you for the opportunity to review your manuscript titled "Assessing percent body fat as measured by bioelectric impedance according to weight self-perception: The CRONICAS Cohort Study." The title should be corrected to reflect that this was a secondary data analysis to examine concordance of self perception of weight and actual measurement of body fat percentage. Thank you for this helpful response. We agree. The title is now changed to “A secondary analysis examining the concordance of self perception of weight and actual measurement of body fat percentage: The CRONICAS Cohort Study.”

Overall the manuscript would benefit from the utilization of a good English copy editor to correct language, tense, and punctuation. Thank you. A good English copy editor has been used to correct language, tense, and punctuation.

The background section needs to be strengthened and more succinctly presented. More information on self-perceived weight status should be blended in and referenced. Please add additional information on BIA. BIA has some strengths, however, is considered quite controversial secondary to issues regarding age, hydration, and time of day that measurements are taken. These issues may affect results. However, they were never mentioned. Is SPW an approved abbreviation? I have not seen it before. So unless it is approved, please spell the words out throughout the paper. Thank you for these very helpful comments. The background was rewritten to be presented more clearly and succinctly. We agree that information on BIA limitations is critical, and it is now added in the limitations section in lines 616-632. SPW has been replaced with “self-perceptions of weight” throughout the manuscript.

The methods section needs to be strengthened. The data source is the only place that you let the reader know this is a secondary data analysis of a larger study. That needs to be clear in the title and more information needs to be given about the primary study under data source. Language to make clear that this is a secondary data analysis is now in lines 110-145 and the title has changed. The methods have been edited and reworded throughout to make this clear.

Under variables you need to clearly give more scientific information on BIA. What are the pros and cons of using this method. Under the self-perceived weight questionnaire there is inadequate information regarding the instrument, reliability, validity, and cut off points. What are the psychometrics with references. Also, has it been tested in this population and what are the alpha coefficients in this study? Are there subscales? How is it scored? Are their subscales and a total score? What do the scores mean? Thank you for your feedback. The limitations of BIA are now discussed in the discussion section, as opposed to the methods section. The questionnaire has been used and studied in previous studies and is based on the WHO STEPs. This particular study was not involved in the development of the protocol as it is a secondary data analysis. The protocol of the original study with the questionnaire is now clearly cited. Question used to assess self-perception of weight has been used in a previous cross-sectional study in Peru with similar results (PLoS One 2012; doi.org/10.1371/journal.pone.0050252).

Under weight status definitions I think you can make a table for the cutoff points and age. We received preliminary feedback that text was preferred in this setting and decided to maintain using the cutoffs by text.

The underestimation of weight status paragraph needs more information and needs to be clarified please.
The underestimation of weight status paragraph has now been clarified and more streamlined.

Under socioeconomic status and education you need to define all of your variables. For example, how did you measure asset possession and household facilities? What is the ranges for low, medium, and high? In what currency? How did you define education? What levels?
The definitions are now clarified. Wealth index was used, as opposed to income, which incorporated assets. Further information on sex and education is now described. Currency is not used because income was not obtained.

Under data analysis you need more information on your procedures for the analysis. You also need more information on how you quantified variation in BIA over time by self-perception and by underestimation.
Procedures for the analysis outlining the models were clarified from lines 255 through lines 287. We also decided to discuss the equations prior to showing them for more clarity which can help better explain how variation in BIA over time by self perception and by underestimation is quantified.

Under discussion in the first section you just reiterated the results. You need to discuss each major finding and blend in literature that agrees and disagrees with your findings and what you think that means and how it adds to the literature.
Thank you for this feedback. We have rewrote the key findings section so that it is more organized and blends in literature (for example, lines 478-482). Because no other studies have compared BIA with self perceptions of weight in Peru, these findings cannot be directly compared against another study. However, to address the comments about literature that agrees/disagrees with the broader findings, we specifically call out comparisons to similar literature in our “Comparison with Literature” section from lines 537-574.

The public health and clinical implications section can be more succinctly presented and some discussion how this knowledge will give clinicians new information to discuss weight and personal self-perception with their patients.
Thank you for this feedback. We recognized that what this study does is provide context for further need in research to truly ascertain the clinical implications to discuss weight and self-perception with their patients, and have modified the language to do so in lines 576-607.

The limitations section needs to include a discussion about the limitations of using BIA.
The limitations section now includes discussion about using BIA which is now listed in lines 616-632.

The conclusion needs to be reworked to succinctly state what was found and next steps.
The conclusion has been modified and rewritten to better state what has happened and, importantly, to clearly state next steps.

Reviewer 2

The study uses a large sample size that is generally representative of Peruvian adults - an understudied population, and objective measures of weight status were included. Additionally, the study is longitudinal; however, it is unclear how much the longitudinal data adds to the present study in the current format of analysis. There are issues with the written quality of the manuscript - many areas need rewording or need more depth and detail, and some sections are difficult to follow. Overall, a stronger rationale is needed for exactly how these data will be able to be used by clinicians and public
health leaders. Thank you for these overarching comments. We have taken steps to improve the written quality of the manuscript, including incorporation of your helpful comments, to improve the organization of the manuscript.

Background:
Line 59-60: explain what a BMI above 25 means - the first sentence suggests you are talking about obesity, but these are overweight statistics. Also, given that overweight levels were fairly similar between males and females in 1980, but females were much more likely to be overweight in 2013, why did you not choose to examine gender in these data? We thank you for this feedback. The purpose of our study was not to examine gender in the data, and so we removed this language as to not deter the reader.

Line 61-62: provide detail on the consequences of the obesity epidemic on cardiovascular health. The purpose of this study was not to provide a connection between the obesity epidemic on cardiovascular health and therefore was removed from the manuscript.

Line 63: please reword. This paragraph has been reworded for clarity.
Line 62-64: what is it about self-perception of weight status that is associated with these negative effects? Incorrectly perceiving your weight status? Everyone has a perception of their weight status, so please explain how it is linked. To clarify this point, the wording has been changed to show that it is indeed poor self-perceptions of weight that have impacted “negative effects” – mostly related to body image and psychological stress. The link is now clarified through lifestyle modifications and dietary practices. This can be found in lines 63-68.

Line 65-67: please provide references. The sentence has been reworded to clarify that the two sentences are referenced by reference (6).

Line 69-70: please provide detail on how this knowledge can aid clinicians and public health leaders to design interventions. What will they do with this information, exactly? Thank you for this feedback. We have received feedback that this should be incorporated in the discussion so have changed the language to suggest possibilities of reframing obesity interventions.

Line 73-75: please reword and provide references. Upon our editing we found this sentence confusing and decided to delete it.

Line 77-81: need more detail on the value of the longitudinal data and the extra depth and value of knowledge this will provide. The sentence was edited and reworded to provide more depth from lines 100-102.

Methods:
Is reference 16 a reference for a protocol or baseline study using these data? If so, please make this clearer in how it is presented. The reference 16 is for the protocol of the study that also has the baseline data reported; this has been clarified in the language from lines 111-145.
Line 101: provide more of a definition of free fat mass.
Upon our editing we found that free fat mass was not a necessary descriptor of the outcome; instead it was clearer to report that it was indeed body fat. Thank you for pointing this out.

Line 110-111: provide more of an explanation as to how height and weight were measured, e.g., what equipment was used, how was BMI calculated from these data.
This has been clarified in lines 157-159.

Line 113-114: the end of this sentence is unclear, please reword. Also, it is best to outline the four descriptions when first mentioned rather than in a separate sentence below.
The sentence has been reworded and the four descriptions are now introduced first; this is all seen in lines 161-173.

Line 116: edit 'their measure BIA weights'. Reword 'they were asked for SPW first'.
This paragraph has been reworded and clarified this point, from lines 161-173.

Line 118-125: I am not sure why the section on benefits of the study is included in the methods - this would be better placed in the discussion. This section is confusing. It would be much better to just state the facts of what measures were completed and what instructions were given to participants.
Thank you for this feedback. This section has now been placed in the discussion.

Line 128: this sentence is not clear. Did you predict sex, age and ethnicity or measure them? Please reword for clarity.
They were not predicted in our study. They were predicted from the Gallagher study. This has been reworded in lines 175-176 to clarify given that “predicted” was not necessary in this description.

Line 130-139: it seems odd to go into so much detail on how BIA was categorised and no detail on how BMI was categorised. I suggest either providing detail on both, or given that you have provided references, go into limited detail on both.
Thank you for your feedback. Because BIA categorization using Gallagher’s method is a less common and understood method compared to BMI, we have received previous feedback to detail the former categorization.

Line 145-146: remove the sentence 'Those who overestimated were not…..'
This was removed.

Line 148-150: edit the wording here - combine the sentences.
This is now reworded and combined to one sentence in lines 223-225.

Line 178: When referring to age, what does centered at 35 years mean? Nowhere in the methods does it describe the demographic variables measured, e.g., sex, ethnicity. Should Equation 2 be described in the text before it is presented in the manuscript?
Line 262 now explains what centering at 35 years entails.
Lines 226-235 now incorporate demographic measure of sex. The demographic measure of age was mentioned with timing in lines 222-225. Ethnicity was not a component of this study; notably all participants were Peruvian as stated in the introduction. Equation 2 is now described in the text before being presented in the manuscript.
Line 189-190: explain how underestimation of weight status is most critical for individuals who are overweight or obese and provide a reference. Explain the amount of missing data - is 3181 the total sample? How many of these provided complete data?
This was reworded to reflect the intention of the study in lines 267-269. Language was incorporated in lines 283-285 to indicate that 12% of the initial observations in the dataset were removed due to missing data, resulting in 3181.

Results:
Ensure the results are written in the same tense throughout.
Thank you. We have edited this section to ensure the tense is consistent throughout the Results section.

Line 199-201: How does this compare with the highest region? The characteristics section varies between comparing a particular characteristic to overweight and obesity prevalence and just obesity prevalence, which is quite confusing and makes it hard to draw comparisons. I suggest keeping it consistent.
We have added language to compare this to the highest rate in the region in lines 297-298. We also appreciate that the metric was confusing so modified the prevalence rates to include overweight and obesity for consistency in lines 294 to 302. We have also removed language that was more suggestive of discussion than results.
Line 210-211: Provide the detail of which setting is related to which kappa score. The results are quite confusing and difficult to follow in places and, at times, vague about direction of the effects in the text. It seems to be a bit hit and miss as to what is reported in the text and what isn't - needs more structure and consistency.
We have added language to show that the kappa score ranges refer to the geographical settings in lines 334-340 and added language throughout to ensure more structure and consistency. This can be seen for example in lines 334-341 which has been modified to better describe and report the findings in the text.

Line 224-225: edit wording.
These lines were deleted after the rewriting of this paragraph as above.

Discussion:
Line 253-267: this paragraph is quite long winded and could be trimmed down.
This paragraph has now been trimmed down and separated into two distinct paragraphs with the first providing an overview on key results, starting at line 478.

Line 270-271: explain how altitude may have played a role or remove reference to this.
Language on altitude has now been removed.

Line 273-279: I'm not convinced by this section - participants who correctly perceived their weight were included in these analyses, and so, they will have brought the mean closer for those who underestimated their weight category. Percent body fat and BIA-assessed weight status use the same data, so it would be inaccurate to say one is poor and is closely associated, when it is simply how it is analysed that has generated these two conclusions.
Thank you for this feedback. Your comments show that our writing in this section was not clear, as the two measures compared are self-perceptions of weight vs. BIA (which is the same as percent body fat). Language has been added to clarify this as well as to bring up the important point that half of the study population did not underestimate and therefore bring the mean closer to those who underestimated.
This can now be found in lines 497 to 530.

Line 282-286: Edit 'a positively associated relationship'.
This has been edited now in lines 531-536.

Line 296: earlier you stated that participants gained 0.05 body fat percentage points each year and now it is 0.03?
These numbers reflect the differences between the crude and adjusted models. The results section is now clarified where the 0.03 comes from in lines 450-452.

Line 294-297: I am not clear what the longitudinal data add to this study in the way it has been analysed, so how can it be expressed as a strength of the study?
Language has been added in lines 546-558 to communicate that this type of analysis results in less variation across the outcome variables because it takes into account that there are several encounters for the same participant.

Line 308-309: suggest rewording.
This has been reworded in lines 580-582.

Line 314-316: Does research back this up? Please provide a reference.
Thank you for this feedback. The commentary here has been modified to reflect the need for further research to investigate the clinical significance of asking about self-perceptions of weight in a clinical setting. This can be found in lines 596 to 602.

Line 320-321: This sentence does not make sense to me - how would a clinician tailor an intervention according to underestimation? Do they typically have access to BIA in their practices?
As above, thank you for this feedback. We recognize that further research needs to be conducted to truly comment on this, and have reworded this language to reflect that in lines 596-607.

Line 348: Surely tailoring interventions by weight self-perceptions would be a bad idea, as most people underestimate their weight? Please clarify what is meant here.
Thank you for your feedback. It is unclear about the the benefits or challenges from this; further research is needed and the language has therefore been changed in lines 602-607.