

PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Weight underestimation linked to anxiety and depression in a cross-sectional study of overweight individuals in a Sami and non-Sami Norwegian population: The SAMINOR Study
AUTHORS	Kvaløy, Kirsti; Melhus, Marita; Silviken, Anne; Broderstad, Ann Ragnhild

VERSION 1 - REVIEW

REVIEWER	Eugenia Romano University of Liverpool, UK
REVIEW RETURNED	04-Jul-2019

GENERAL COMMENTS	<p>The manuscript presents an interesting study on weight perception and its association with mental health in the Norwegian Sami population. However, some points need to be addressed for a better presentation of the study before the article is published.</p> <p>INTRODUCTION The introduction is detailed, but I think a few words more related to the Sami population (e.g. lifestyle) could be useful to the readers to better frame the population analysed and give more context to the study, given how weight perception is strongly influenced by cultural and lifestyle factors. Moreover, the authors mention body satisfaction as a factor able to explain the association between obesity and depression (line 100, page 6), but the study actually relies on weight perception. I suggest adding a few references to studies related to the association between weight perception and depression in the adult population to better support the methodology, along with the findings on young adults (line 103).</p> <p>METHODS The methods could benefit from further details on the time needed to complete the questionnaire, and if attention checks were provided to ensure participants were careful when reading and answering the questionnaire. It is reported that questionnaires were distributed in Norwegian and in Northern Sami language in some municipalities (line 136, page 7). Did participants access the questionnaire from their houses? If not, what was the setting for taking part to the study? Was the questionnaire equally available in both languages? All these factor may have affected participation rate for Sami participants. Furthermore, the "Ethnicity" section could benefit from using quotes to separate the question reported from the questionnaire at lines 148-9, as the sentence is a bit confusing to read the way it is now.</p>
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	<p>The sample size is large, but there was no reference to power calculations, which could be useful. If not provided, their absence should be mentioned in the limits section. Moreover, the “Statistics” section, it does not appear that analyses were controlled for participants’ BMI, which I think is an important variable to adjust for (especially considering that the measure was not self-reported). Why did the authors choose to not control for it? This needs to be justified, and if the authors choose not to provide updated models controlling for BMI, this is another limit that needs to be addressed in the Discussion.</p> <p>RESULTS</p> <p>The results section reports (line 252, page 12) that men underestimated their weight “significantly more” than women. However, the result links back to a figure, and no p value is reported to mark this significant difference. Moreover, the tables for the logistic regression could be more complete if they also reported b and standard error values.</p> <p>DISCUSSION</p> <p>The discussion could benefit by better framing the findings related to the Sami participants in the context of their lifestyle. Furthermore, there are many other psychological variables that could explain the findings but were not assessed in this study, such as experiences of weight-related discrimination (e.g. how likely are they to recur among Sami people compared to non-Sami?). These should be further discussed, while at the current state, the discussion section mainly focusses on gender differences. Addressing those factors that were not assessed in the study but could explain the results reported is useful, as they delineate the future directions in research that the findings from this work imply, and should be reported in the manuscript. Finally, the limits section should be updated according to the comments reported for the methods section.</p> <p>Overall, I believe the results from this study are interesting, as weight perception has a strong cultural component, and findings coming from diverse populations help delineating how this factor can influence people’s psychological and physical health. With a round of good corrections, this manuscript should be ready to be published in the journal.</p>
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REVIEWER	Isabelle Bray UWE Bristol, England
REVIEW RETURNED	21-Jul-2019

GENERAL COMMENTS	<p>Abstract - please note that the Conclusion section of the Abstract does not match the Results. When you give the results in the Abstract, please refer to proportions rather than numbers.</p> <p>Discussion - you suggest that BMI may not be an ideal measure when comparing populations of different average height. It is not obvious to me, since BMI takes height into account. It would therefore be interesting to refer to any literature about this. Also, did you consider alternatives e.g. some studies use waist circumference, but maybe this was not available in the data set?</p> <p>Introduction</p>
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	<p>I think the Introduction could say more about the existing evidence about body dissatisfaction and anxiety/depression. Line 97/98, the sentence 'Possible links between obesity and depression include the severity of obesity and female gender' is not clear. Please clarify whether you are talking about mediators or moderators. Line 109, the sentence starting 'As Sami represent...' does not make sense, please delete the first 'As'.</p> <p>Methods It would be helpful to have some further justification for your definition of 'Sami' based on the available data. For example, how has this been defined in previous studies? Did you consider doing sensitivity analyses to see the effect of changing this definition? Was this definition decided in consultation with the population in question? Please mention in this section how you analysed the age variable - e.g. as continuous</p> <p>Discussion Your main objective was to study the relationship between underestimation of weight and anxiety/depression, and you have the very interesting finding that it is protective for Sami men and for non-Sami women, which is not straightforward to explain. I think that the Discussion could focus more on exploring possible explanations (e.g. different weight ideals for men and women in the two populations) rather than explaining some of the other results which do not directly relate to the main research question. I think you touch on this already, but I did not feel it was fully discussed. Line 294 should read 'associated with better' rather than 'associated to better' Line 421 Can you provide a reference for the statement comparing Sami and Finnmark? Please make some suggestions for the direction of further work in this area.</p> <p>Figure 1. I would prefer not to see pie charts used to represent two simple proportions, which can easily be stated in the text. Line 211 - should read 'Potential interactions....were tested' (not 'was')</p>
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VERSION 1 – AUTHOR RESPONSE

Response to Reviewers:

Reviewer(s)' Comments to Author:

Reviewer: 1

Reviewer Name: Eugenia Romano

Institution and Country: University of Liverpool, UK Please state any competing interests or state 'None declared': None declared

The manuscript presents an interesting study on weight perception and its association with mental health in the Norwegian Sami population. However, some points need to be addressed for a better presentation of the study before the article is published.

INTRODUCTION

The introduction is detailed, but I think a few words more related to the Sami population (e.g. lifestyle) could be useful to the readers to better frame the population analysed and give more context to the study, given how weight perception is strongly influenced by cultural and lifestyle factors.

Response: The following additional text have been added concerning today's situation linked to Sami lifestyle: "The indigenous Sami people traditionally living mainly in northern parts of Norway, Finland, Sweden and the Kola Peninsula of Russia embrace a variety of languages, cultures and social conditions largely depending on geographic area (7). From traditional occupations linked to reindeer herding, hunting, fishing and farming, employment of most Sami today are similar to non-Sami living in the same geographical areas. Somatic health is also fairly similar comparing the two ethnic groups (8)." (page 5, line 84-89).

Moreover, the authors mention body satisfaction as a factor able to explain the association between obesity and depression (line 100, page 6), but the study actually relies on weight perception.

Response: The sentence which included the mentioned expression have been changed to "The latter may be through dissatisfaction with own weight, which is linked to low self-esteem and further to depression (14)" (page 6 line 104).

I suggest adding a few references to studies related to the association between weight perception and depression in the adult population to better support the methodology, along with the findings on young adults (line 103).

Response: There are very few studies addressing this issue in adults. However, as suggested, we have added two references concerning the association between body weight underestimation and depression in Korean adults. We have also moved text concerning the association between weight underestimation and mental health from the Discussion to the Introduction to improve the readers understanding of the issue. (Page 6, line 105-110).

METHODS

The methods could benefit from further details on the time needed to complete the questionnaire, and if attention checks were provided to ensure participants were careful when reading and answering the questionnaire. It is reported that questionnaires were distributed in Norwegian and in Northern Sami language in some municipalities (line 136, page 7). Did participants access the questionnaire from their houses? If not, what was the setting for taking part to the study? Was the questionnaire equally

available in both languages? All these factor may have affected participation rate for Sami participants.

Response: The time spent by each participant when filling out the questionnaire is a bit uncertain, although it may have taken up to 1-2 hours as the questionnaire is eight pages long. We have added the following text concerning the logistics regarding the questionnaire: "The survey consisted of a short clinical examination and a questionnaire (available at www.saminor.no). All invitees received a questionnaire in Norwegian. In addition, invitees within the Administrative Area for the Sami Language (Karasjok, Kautokeino, Nesseby and Tana) also received a Northern Sami version of the questionnaire. In Porsanger, Kåfjord and Lyngen, the Sami questionnaire was available upon request. Approximately 2 weeks prior to data collection, the invitation letter was posted to invitees; it included an appointment time, an informational brochure and a questionnaire, which contained invitee's assigned study ID. Questionnaires and signed written consent forms were handed in at attendance for clinical examination (24)." (page 7-8, line 141-149).

Furthermore, the "Ethnicity" section could benefit from using quotes to separate the question reported from the questionnaire at lines 148-9, as the sentence is a bit confusing to read the way it is now.

Response: The wording of this section was changed to the following: "The following 11 questions regarding home language, ethnic background and self-perceived ethnicity/identity were used to define ethnicity: "What language do/did you/your mother/your father/[all 4 of] your grandparents speak at home?", "What is your/your father's/your mother's ethnic background?" and " What do you consider yourself as?" The response options were: "Norwegian", "Sami", "Kven", and "Other". Several answers could be chosen. Participants were categorized as Sami if they considered themselves Sami and/or that they had Sami ethnic background (Sami self-identification), and in addition reported Sami as home language for at least one grandparent, parent, or themselves (Sami language connection). Participants not fulfilling the criteria were categorised as non-Sami. The definitions we have used comply with several recent SAMINOR-based studies (25-27). The use of both self-identification (subjective criterion) and language connection (objective criterion), resembles the criteria requested in order to vote or be elected to the Sami Parliament (7). However, all categorisations may have different validity in different geographic regions and within different subgroups in the Sami population (22)." (page 8-9, line 161-173)

The sample size is large, but there was no reference to power calculations, which could be useful. If not provided, their absence should be mentioned in the limits section. Moreover, the "Statistics" section, it does not appear that analyses were controlled for participants' BMI, which I think is an important variable to adjust for (especially considering that the measure was not self-reported). Why did the authors choose to not control for it? This needs to be justified, and if the authors choose not to provide updated models controlling for BMI, this is another limit that needs to be addressed in the Discussion.

Response: The limitation of not including power calculations is now mentioned in the Discussion as follows: "Power calculations were also difficult to do, as the strength of the studied relationships were hard to predict. The data used in this paper is part of a much larger data collection that was already

conducted when we developed the research questions for this paper. Hence, increasing the sample size based on power calculations would not be possible.” (page 20, line 458-461).

Thank you for the important comment concerning BMI adjustments. The reason for not including BMI adjustments in the first place were that the main exposure “weight underestimation” includes BMI, however, we realize that this adjustment may compensate the limitation linked to the sample including individuals with an extensive range in BMI (from 25 and upwards). We have therefore done some additional analyses where adjustments for BMI have been added in the regression models. Please see the results in the revised Table 2, Table 3 and Supplementary table 2. The changed numbers as a consequence of the additional adjustments, have been added whenever relevant in the revised manuscript.

RESULTS

The results section reports (line 252, page 12) that men underestimated their weight “significantly more” than women. However, the result links back to a figure, and no p value is reported to mark this significant difference. Moreover, the tables for the logistic regression could be more complete if they also reported b and standard error values.

Response: Thank you for these comments. We have deleted the mentioned sentence as we have also deleted Figure 1 as recommended previously. In Table 2 and 3 we have added B and standard error values as recommended.

DISCUSSION

The discussion could benefit by better framing the findings related to the Sami participants in the context of their lifestyle. Furthermore, there are many other psychological variables that could explain the findings but were not assessed in this study, such as experiences of weight-related discrimination (e.g. how likely are they to recur among Sami people compared to non-Sami?). These should be further discussed, while at the current state, the discussion section mainly focusses on gender differences. Addressing those factors that were not assessed in the study but could explain the results reported is useful, as they delineate the future directions in research that the findings from this work imply, and should be reported in the manuscript.

Response: Thank you for useful comments concerning the Discussion. We have now deleted a paragraph related to gender differences (previously page 17, line 381-388). We have in addition added the following text to elaborate the studied issue concerning Sami life style and discrimination and further potentials for future investigations: “Sociocultural influences which favors heavier body image ideals is suggested implicated, however, whether general ethnic and/or gender difference concerning weight satisfaction exist or the awareness of overweight/obesity differ, are factors that are still not fully explored (32). In Sami, no studies directly addressing body image or weight perception or factors that could influence this exist at present; however, Sami exposed to discrimination have shown higher odds of obesity (33), and one may speculate whether underlying psychological stressors could also affect factors influencing weight satisfaction and mental health. In a study of ethnic discrimination and health (33), sex-differences concerning discrimination related to obesity was

linked to whether the Sami were in majority or minority in his/her municipality. This is interesting and worth pursuing in follow-up studies of our findings related to ethnic differences between the sexes. The issue concerning differential body image perception in Sami and non-Sami will be possible to investigate due to a modified version of the Stunkard's Figure Rating Scale (34) included in the questionnaire of the SAMINOR 2 Clinical Survey (24)." (page 15-16, line 342-355)

Finally, the limits section should be updated according to the comments reported for the methods section.

Response: We have added a few new comments on this in the Discussion, but have also elaborated on some of the mentioned issues in the Method section.

Overall, I believe the results from this study are interesting, as weight perception has a strong cultural component, and findings coming from diverse populations help delineating how this factor can influence people's psychological and physical health. With a round of good corrections, this manuscript should be ready to be published in the journal.

Reviewer: 2

Reviewer Name: Isabelle Bray

Institution and Country: UWE Bristol, England Please state any competing interests or state 'None declared': None declared

Please leave your comments for the authors below Abstract - please note that the Conclusion section of the Abstract does not match the Results. When you give the results in the Abstract, please refer to proportions rather than numbers.

Response: Thank you for noticing this mix-up. We have changed the Conclusion accordingly. The reason why we have included odds ratio values in the abstract rather than proportions is that these results are from the main analyses, which include logistic regression models.

Discussion - you suggest that BMI may not be an ideal measure when comparing populations of different average height. It is not obvious to me, since BMI takes height into account. It would therefore be interesting to refer to any literature about this. Also, did you consider alternatives e.g. some studies use waist circumference, but maybe this was not available in the data set?

Response: Thank you for this useful comment. As Sami are on average five cm shorter than non-Sami (50) we thought this may have affect the relationship between BMI-level and body appearance differently. We realise, however, that this will be speculative and have decided to delete this paragraph.

Introduction

I think the Introduction could say more about the existing evidence about body dissatisfaction and anxiety/depression.

Line 97/98, the sentence 'Possible links between obesity and depression include the severity of obesity and female gender' is not clear. Please clarify whether you are talking about mediators or moderators.

Line 109, the sentence starting 'As Sami represent...' does not make sense, please delete the first 'As'.

Response: Thank you for this comment, which was also mentioned by the other reviewer. As a response, we have moved a paragraph from the Discussion to the Introduction. (Page 6, line 105-110).

We decided to delete the mentioned sentence 'Possible links between obesity and depression include the severity of obesity and female gender' and have also deleted "As" from the sentence "As Sami represent..." accordingly.

Methods

It would be helpful to have some further justification for your definition of 'Sami' based on the available data. For example, how has this been defined in previous studies? Did you consider doing sensitivity analyses to see the effect of changing this definition? Was this definition decided in consultation with the population in question?

Please mention in this section how you analysed the age variable - e.g. as continuous

Response: We have used the ethnic categorization used in the most recent papers published concerning the SAMINOR population. This have been referred to on page 9, line 169-170. We did not do sensitivity analysis in our study regarding this, but have mentioned points concerning this issue in the Discussion, page 19, line 432-439.

We have added that we included the age variable as continuous in the Method section (page 9, line 179) and as additional information related to the tables and figure.

Discussion

Your main objective was to study the relationship between underestimation of weight and anxiety/depression, and you have the very interesting finding that it is protective for Sami men and for non-Sami women, which is not straightforward to explain. I think that the Discussion could focus more on exploring possible explanations (e.g. different weight ideals for men and women in the two

populations) rather than explaining some of the other results which do not directly relate to the main research question. I think you touch on this already, but I did not feel it was fully discussed.

Response: We have restructured the Discussion by moving some information to the Introduction and deleting a paragraph concerning general gender issues (see response to the other reviewer). Additionally, we have added more text concerning factors that could be important to pursue for further investigations of the gender differences identified in our study between Sami and non-Sami (page 15-16, line 342-355).

Line 294 should read 'associated with better' rather than 'associated to better'

Line 421 Can you provide a reference for the statement comparing Sami and Finnmark?

Please make some suggestions for the direction of further work in this area.

Response: The correction of wording mentioned in line 294 in the unrevised manuscript has been done accordingly. We have added a reference concerning the statement comparing Sami from the Finnmark County, as well.

We have added the following text related to this: "As no information is available about the ethnic background of non-respondents, we do not know whether participation rates of Sami and non-Sami differ. Previous studies of the same material have shown that participation was generally high in Sami-dominated municipalities in Finnmark County, and lower in municipalities further south (24) where the Sami are in minority and where Sami self-identification is more controversial due to a more heavily assimilation process previously (50). This may have influenced the results slightly as small regional health differences have been identified in general (26) and should be accounted for in future studies." (page 19, line 432-439).

Figure 1. I would prefer not to see pie charts used to represent two simple proportions, which can easily be stated in the text.

Response: We have removed this figure accordingly.

Line 211 - should read 'Potential interactions....were tested' (not 'was')

Response: This mistake has been corrected in the revised manuscript.

VERSION 2 – REVIEW

REVIEWER	Eugenia Romano University of Liverpool
REVIEW RETURNED	21-Aug-2019

GENERAL COMMENTS	The authors have addressed the comments and suggestions reported in the previous review. With the added edits, I believe the manuscript is now ready for publication in the journal.
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REVIEWER	Isabelle Bray UWE Bristol, UK
REVIEW RETURNED	06-Sep-2019

GENERAL COMMENTS	<p>Thank you for making revisions in line with reviewers comments. I note just a few outstanding issues:</p> <p>Abstract. Methods - now that results are adjusted for BMI, is this clear in Abstract? Results - still refers to the word 'numbers' where proportions would be more relevant to the point being made (comparing obesity levels in Sami an non-Sami).</p> <p>Line 195. I wonder about the assertion that 'the present paper only includes study participants with overweight/obesity and hence a potential underestimation of weight'. What if someone is overweight (rather than obese) but thinks they are 'extremely fat' rather than 'too fat' - is this not overestimation of weight?</p> <p>Line 287 - lower confidence limit for Sami should be 1.01 not 0.01</p> <p>Line 290 - I question the statement 'As expected, weight estimation is less likely in individuals with higher BMI. This is not immediately obvious to me, so perhaps remove 'as expected' or add a reference to show this is expected</p> <p>Line 343 - you do not need both 'suggested' and 'implicated'</p>
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VERSION 2 – AUTHOR RESPONSE

Response to Reviewers:

Reviewer(s)' Comments to Author:

Reviewer: 1

Reviewer Name: Eugenia Romano

Institution and Country: University of Liverpool

Please state any competing interests or state 'None declared': None declared

Please leave your comments for the authors below

The authors have addressed the comments and suggestions reported in the previous review. With the added edits, I believe the manuscript is now ready for publication in the journal.

Reviewer: 2

Reviewer Name: Isabelle Bray

Institution and Country: UWE Bristol, UK

Please state any competing interests or state 'None declared': None declared

Please leave your comments for the authors below

Thank you for making revisions in line with reviewers comments. I note just a few outstanding issues:

Abstract.

Methods - now that results are adjusted for BMI, is this clear in Abstract?

Response: The abstract is now updated with relevant changes after BMI was additionally adjusted for in the analyses, line 43-45 and line 50 (page 2).

Results - still refers to the word 'numbers' where proportions would be more relevant to the point being made (comparing obesity levels in Sami and non-Sami).

Response: The first sentence in the Results-section of the Abstract is changed accordingly (line 39-40, page 2).

Line 195. I wonder about the assertion that 'the present paper only includes study participants with overweight/obesity and hence a potential underestimation of weight'. What if someone is overweight (rather than obese) but thinks they are 'extremely fat' rather than 'too fat' - is this not overestimation of weight?

Response: Thank you for this important comment. We have now added the following: "Individuals with overweight or obesity that categorised themselves as 'Extremely fat' or 'Too fat' were considered as perceiving their weight accurately. Weight overestimation, e.g. overweight individuals that reported themselves as 'Extremely fat' was not taken into account due to the low occurrence (n=10)." Line 196-199, page 10.

Line 287 - lower confidence limit for Sami should be 1.01 not 0.01

Response: Thank you for noticing this mistake. We have now changed this accordingly (line 291, page 13).

Line 290 - I question the statement 'As expected, weight estimation is less likely in individuals with higher BMI. This is not immediately obvious to me, so perhaps remove 'as expected' or add a reference to show this is expected.

Response: Thank you for this comment. We realise that “higher BMI” was written instead of “lower BMI” and have now changed the sentence to the following: “As expected, weight underestimation was less likely in individuals with lower compared to higher BMI.....” (line 293-294, page 13).

Line 343 - you do not need both 'suggested' and 'implicated'

Response: We have changed this sentence to the following: “Even if sociocultural factors that favor heavier body image ideals are suggested, it is unknown whether general ethnic and/or gender difference concerning weight satisfaction exist or whether the awareness of overweight/obesity differs in this context” (line 346-349, page 16).