

PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Gender differences in bodyweight change following COVID-19 lockdown measures in the Netherlands. A prospective longitudinal study
AUTHORS	van den Broek, Thijs; Fleischmann, Maria

VERSION 1 – REVIEW

REVIEWER	Hamamoto, Yoshiyuki Kansai Electric Power Medical Research Institute, Center for Diabetes, Metabolism and Endocrinology
REVIEW RETURNED	05-Aug-2021

GENERAL COMMENTS	<p>In this manuscript, entitled “Gender differences in bodyweight change following COVID-19 lockdown measures in the Netherlands. A prospective study.”, Broek VD et al. investigated the impact of lockdown measures to contain the COVID-19 pandemic on bodyweight change among Dutch men and women using a random national sample. They report that women showed more significant body weight gain compared to men during the COVID-19 pandemic year of 2020.</p> <p>The gender differences in weight gain have been reported from not a few countries/groups and the results varied depending on the social and cultural background differences. Considering this, this study has a value from the viewpoint of diversity reporting the situation in the Netherlands. However, there are a couple of issues; the major weakness is that the measure of bodyweight was self-reported and cannot ensure the accuracy as authors mention in the manuscript even though this study was performed “prospective approach”, and as another weakness, this study shows just an event but failed to elucidate the reason for the observed difference. Theoretically, lockdown measures tend to impact more largely on the working age people and those who are working out of home. The surveys such like questionnaire about lifestyle change, people flow survey, etc. may help to clarify what is happening.</p> <p>The topic is interesting and valuable. Below is my additional question.</p> <p>1. The data for 2016 and earlier considerably differ to those for 2017 and later. Isn't there a possibility that the data were collected from different population or different measurements?</p>
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REVIEWER	Gornicka, Magdalena Warsaw University of Life Sciences
REVIEW RETURNED	07-Aug-2021

GENERAL COMMENTS	This is an interesting and mostly well-written manuscript, but I have some additional comments besides those in the attachment: - in my opinion, data for all participants (regardless of gender)
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	<p>should be added to the results (tables, text) and raw data on body weight in the period >2016-2020</p> <ul style="list-style-type: none"> - Apart from the change in body weight, if you have data on body height (and I think so), it would be interesting to show if and how the prevalence of individual BMI categories in the population has changed. - the discussion is very poor and should be improved. Up to now, many publications about body mass/weight changes during COVID have appeared, please add them. How can explain the body weight gain in women and the lack in men? - one third of the references are older than 5 years. In my opinion, the references should be updated and completed.
REVIEWER	Madden, David University College Dublin, Economics
REVIEW RETURNED	18-Oct-2021
GENERAL COMMENTS	<p>This is a clearly written paper which addresses a well defined question. The data is adequate to answer the question and the statistical analysis is standard and it is carried out competently. it is a useful addition to knowledge surrounding the non-Covid health effects of lockdowns. One observation I would make is that the authors might also estimate the model with interactions for primary economic status. This would perhaps enable a greater fleshing out of the pathways as to how Covid related lockdowns might affect weight. The authors speculate that stress might be a factor, but it might also be related to losing the exercise associated with a physically demanding job which is ruled out via lockdown. Or just the loss of exercise in general. This could be teased out by interactions with primary economic status or indeed with age.</p> <p>However, overall, I think this paper is worth publishing.</p>

VERSION 1 – AUTHOR RESPONSE

Response to Reviewer 1

The major weakness is that the measure of bodyweight was self-reported and cannot ensure the accuracy as authors mention in the manuscript even though this study was performed “prospective approach”, and as another weakness, this study shows just an event but failed to elucidate the reason for the observed difference. Theoretically, lockdown measures tend to impact more largely on the working age people and those who are working out of home. The surveys such like questionnaire about lifestyle change, people flow survey, etc. may help to clarify what is happening.

We agree with R1 that it is unfortunate that we had to rely on self-reported, rather than objective bodyweight measures. However, as we explain in the discussion section, research has shown that within-person changes in self-reported bodyweight – such as analyzed here –have only minor discrepancies with changes in objectively measured bodyweight.

The findings reported are consistent with our hypotheses / theoretical rationale centered on stress. However, as R1 correctly points out, our analyses do not allow us to conclude that the presumed stress mechanism indeed underlies the greater gain in bodyweight following COVID-19 lockdown

measures in women than in men. In the discussion we now elaborate on this, and also discuss potential alternative underlying mechanisms.

We agree with R1's remark that lockdown measures may theoretically be expected to have a particularly large impact on people of working age. This is why our analyses are also focused specifically on working age men and women. It would be interesting to explore whether weight change is most pronounced among people working from home, as R1 suggests, but given that we have no information on whether respondents work from home, such analyses are unfortunately unfeasible. See also our response to R3.

1. The data for 2016 and earlier considerably differ to those for 2017 and later. Isn't there a possibility that the data were collected from different population or different measurements?

The same instruments were used over the full 1993-2020 period and sampling procedures also remained largely similar. R2 expresses concern about the bodyweight differences between the "2016 and prior"-observations and the observations from 2017 onwards. We would like to point out that in the model for women, the difference between the coefficient estimates for the year 2017 and for "2016 and prior" is not all that large and also not statistically significant ($b = -0.32$; 95% CI: $-0.92, 0.29$). In the model for men, the difference is larger and statistically significant ($b = 0.63$; 95% CI:

0.20, 1.07). It should be noted, however, that the median year of data collection for the observations in the "2016 and prior"-group was 2003. The bodyweight differences between the "2016 and prior"-observations and the observations for 2017 onwards may well reflect that, among Dutch men, the rate of annual weight gain has slowed down in the last decades. Declines in the annual weight gain rates have also been documented for Canada (Orpana, Tremblay, & Fines, 2006) and Australia (Peeters, Magliano, Backholer, Zimmet, & Shaw, 2014).

Response to Reviewer 2

1. In my opinion, data for all participants (regardless of gender) should be added to the results (tables, text) and raw data on body weight in the period >2016-2020. Apart from the change in body weight, if you have data on body height (and I think so), it would be interesting to show if and how the prevalence of individual BMI categories in the population has changed.

As suggested by R2, we now present more extensive descriptive statistics in Appendix A, including BMI and BMI categories. Numbers of observations are slightly lower for BMI than for weight due to exclusions of cases with missing / invalid (<100cm; > 240 cm) height information.

2. The discussion is very poor and should be improved. Up to now, many publications about body mass/weight changes during COVID have appeared, please add them. How can explain the body weight gain in women and the lack in men?

In response to this comment we added 18 recent references, mostly from 2021. We also agree that more discussion about the potential mechanisms underlying the greater bodyweight gain in women than in men was called for. We therefore now elaborate on this more extensively in the discussion section.

3. One third of the references are older than 5 years. In my opinion, the references should be updated and completed.

See our response to the previous point.

Response to Reviewer 3

1. This is a clearly written paper which addresses a well defined question. The data is adequate to answer the question and the statistical analysis is standard and it is carried out competently. It is a useful addition to knowledge surrounding the non-Covid health effects of lockdowns. One observation I would make is that the authors might also estimate the model with interactions for primary economic status. This would perhaps enable a greater fleshing out of the pathways as to how Covid related lockdowns might affect weight. The authors speculate that stress might be a factor, but it might also be related to losing the exercise associated with a physically demanding job which is ruled out via lockdown. Or just the loss of exercise in general. This could be teased out by interactions with primary economic status or indeed with age.

We would like to thank R3 for the plausible suggestion that the bodyweight gains could also be related to losing the exercise associated with a physically demanding job, which may be ruled out via lockdown. We now reflect on this in the discussion section and also estimated additional models (see

Appendix C). There are two reasons we doubt that the bodyweight gain in women that we found is indeed attributable to losing out on physically demanding work tasks. First, Statistics Netherlands data show that physically demanding jobs are more common in men than in women, but we found weaker, rather than stronger, effects for men than for women. Also, the analyses presented in Appendix C did not provide evidence that bodyweight gain was more pronounced for persons who were in paid employment than for their counterparts who were not

References

Orpana, H. M., Tremblay, M. S., & Fines, P. (2006). *Trends in weight change among Canadian adults: Evidence from the 1996/1997 to 2004/2005 National Population Health Survey*. Ottawa: Statistics Canada.

Peeters, A., Magliano, D. J., Backholer, K., Zimmet, P., & Shaw, J. E. (2014). Changes in the rates of weight and waist circumference gain in Australian adults over time: A longitudinal cohort study. *BMJ Open*, 4(1), e003667. <https://doi.org/10.1136/bmjopen-2013-003667>

VERSION 2 – REVIEW

REVIEWER	Hamamoto, Yoshiyuki Kansai Electric Power Medical Research Institute, Center for Diabetes, Metabolism and Endocrinology
REVIEW RETURNED	24-Jan-2022
GENERAL COMMENTS	Thank you very much for addressing the comments.
REVIEWER	Gornicka, Magdalena Warsaw University of Life Sciences
REVIEW RETURNED	18-Jan-2022
GENERAL COMMENTS	Thank you for considering my comment.
REVIEWER	Madden, David University College Dublin, Economics
REVIEW RETURNED	19-Jan-2022
GENERAL COMMENTS	<p>This seems to be a well-written and competent study of how Covid measures impacted upon the weight of a representative sample of Dutch people and in particular the gender impact. The methods used are appropriate. A suggestion I would have, perhaps for future research is to investigate where in the distribution of weight this increase occurred. If the increase is primarily amongst women who had quite low or medium weight to begin with, then the health implications may not be too severe. But if it happened amongst women who were already overweight/obese or near these thresholds then the health implications are more grave. Quantile fixed effects regression would perhaps pick this up. Or there could be interaction with period 1 weight.</p> <p>It will also be interesting to see if the impact is a once-off when 2021 data become available. Also what the effect will be when all restrictions are lifted, as we all hope they will be soon, though that may need to wait until 2023 data is available.</p>