

PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Is neighbourhood walkability related to body mass index among different age groups? A cross-sectional study of Canadian urban areas
AUTHORS	Thielman, Justin; Copes, Ray; Rosella, Laura; Chiu, Maria; Manson, Heather

VERSION 1 – REVIEW

REVIEWER	Hannah Jordan University of Sheffield, UK
REVIEW RETURNED	04-Jul-2019

GENERAL COMMENTS	<p>The paper offers a clear and practical description of the relationship between the walkability of a residential area and BMI in the resident population.</p> <p>Clarity could be increased around table 3 which appears to report the differences in log(BMI) for each quintile. However, reversing the log transformation for the presentation of the results would help many readers to intuitively interpret the table.</p> <p>This aside, I think the publication of null results in this field is important particularly, as in this case, where practical suggestions for a shift in direction of future research are made.</p>
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REVIEWER	Rania Wasfi CRCHUM, Université de Montréal
REVIEW RETURNED	18-Sep-2019

GENERAL COMMENTS	<p>The paper is well written and the objectives and analysis are clear.</p> <p>I have a major concern with the analysis though, which is the fact that BMI was not stratified by sex in the regression models. Previous longitudinal research in Canada using the National Population health survey (NPHS) has found that walkability was associated with higher BMI trajectories of men only and not with women. The authors cite one of these papers (Wasfi, et al. 2016), and mention that they have chosen the covariates in their analysis based on their review of a number of papers including the NPHS paper.</p> <p>I would highly encourage the authors to stratify their analysis by sex to see if they will find similar findings of positive associations between men BMI and walkability to confirm their findings, specifically that the sample size permits.</p> <p>I am not sure also that BMI is the best measure for older adults, please elaborate on this point.</p>
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	<p>The discussion will benefit from discussing more studies that found not only negative associations between BMI and walkability, but also elaborate on negative findings. Currently, the discussion elaborates on negative findings more, and doesn't discuss details about positive associations.</p> <p>I am also wondering what is the date of the walkability data, compared to the CCHS data (the 2 cycles from 2007 to 2011). Is there a big-time difference between the walkability data release and CCHS cycles? please elaborate and mention the limitations if any.</p>
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VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Reviewer Name

Hannah Jordan

Institution and Country

University of Sheffield, UK

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

Please leave your comments for the authors below

The paper offers a clear and practical description of the relationship between the walkability of a residential area and BMI in the resident population.

Clarity could be increased around table 3 which appears to report the differences in log(BMI) for each quintile. However, reversing the log transformation for the presentation of the results would help many readers to intuitively interpret the table.

Great suggestion, thank you. We reverse transformed the mean predicted log(BMI) values and their confidence intervals. We added a column containing these values to tables 4 and 5, which are the tables displaying differences in log(BMI). We also added the following sentence to the Statistical analysis subsection of the Methods:

"After modeling log(BMI), we reverse transformed the mean predicted log(BMI) values and their confidence intervals to obtain the average predicted BMI in each Walk Score® quintile."

This aside, I think the publication of null results in this field is important particularly, as in this case, where practical suggestions for a shift in direction of future research are made.

Reviewer: 2

Reviewer Name

Rania Wasfi

Institution and Country

CRCHUM, Université de Montréal

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

Please leave your comments for the authors below

The paper is well written and the objectives and analysis are clear.

I have a major concern with the analysis though, which is the fact that BMI was not stratified by sex in the regression models. Previous longitudinal research in Canada using the National Population health survey (NPHS) has found that walkability was associated with higher BMI trajectories of men only and not with women. The authors cite one of these papers (Wasfi, et al. 2016), and mention that they have chosen the covariates in their analysis based on their review of a number of papers including the NPHS paper.

I would highly encourage the authors to stratify their analysis by sex to see if they will find similar findings of positive associations between men BMI and walkability to confirm their findings, specifically that the sample size permits.

Thank you for the suggestion. We performed a subgroup analysis by sex, as recommended. We added the results of this analysis as two new tables: Table 3 and Table 5. We also added text to several sections, as follows:

Abstract:

“After adjustment, differences between walkability quintiles in BMI and zBMI were small and not statistically significant, except for males aged 6-17 in the second-highest walkability quintile who had significantly lower zBMIs than those in the lowest quintile.

Conclusion: After accounting for confounding factors, we did not find evidence of a relationship between walkability and BMI in children or adults overall, or in any age subgroup with sexes combined. However, post hoc analysis by sex suggested males aged 6-17 in more walkable areas may have lower zBMIs.”

Statistical analysis subsection of Methods:

“We also performed post hoc subgroup analyses of males and females separately, as sex has also been shown to interact with walkability (23).”

BMI z-score subsection of Results:

“In the subgroup analysis by sex, males aged 6-17 in higher Walk Score® quintiles had lower average BMI z-scores, a difference not observed among females (Table 3). The difference among males in the fourth quintile was statistically significant and remained significant after adjusting for age, cultural/racial origin, immigration, household income, and fruit/vegetable consumption.”

Summary subsection of Discussion:

“However, in our post hoc analysis of sex subgroups, there was evidence that males aged 6-17 living in higher Walk Score® quintiles had lower BMI z-scores than those in the lowest quintile, on average.”

“A longitudinal study by Wasfi and colleagues found that men who moved to more walkable areas had decreased BMI trajectories, while men who moved to less walkable areas had increased BMI trajectories; however, no relationship between walkability and BMI was found among women (23). After adjusting for confounders, our study did not show a significant relationship between walkability and BMI among adult males or females; however, we did find evidence of a lower average BMI z-score among male children in higher Walk Score® quintiles, which did not show up among female children. Firm conclusions cannot be drawn from this finding, as it was the result of a post hoc subgroup analysis. However, future research should further explore how the relationship between walkability and BMI z-score may differ between males and females.”

Conclusions subsection of Discussion:

“Although, in our post hoc analysis of sex subgroups, there appeared to be a significant association between walkability and BMI z-score among males aged 6-17. Future studies are needed to explore whether a relationship exists among boys, but not girls.”

I am not sure also that BMI is the best measure for older adults, please elaborate on this point.

Thank you for flagging this. We added the following text to our description of the limitations of BMI in the Discussion:

“The association between BMI and mortality is stronger among some populations than others. For instance, it is stronger among younger adults than among older adults (1).”

The discussion will benefit from discussing more studies that found not only negative associations between BMI and walkability, but also elaborate on negative findings. Currently, the discussion elaborates on negative findings more, and doesn't discuss details about positive associations. We added the following text to the Discussion, elaborating on the positive findings from earlier studies and how they relate to our study:

“Ontario is a province of Canada that includes over one third of Canada’s population, so the aforementioned positive results are based on populations similar to our study population. Perhaps our discordant results are due to our use of objective measures of BMI, rather than self-report. Self-reported BMI values are prone to biases (4), so it is possible that mitigating these biases resulted in our non-significant results.”

We also added text to the Discussion that further describes our study’s findings:

“Although, while not statistically significant, average BMI was slightly lower in the highest walkability quintile among adults overall and in all adult subgroups. Additionally, in our post hoc analysis of sex subgroups, there was evidence that males aged 6-17 living in higher Walk Score® quintiles had lower BMI z-scores than those in the lowest quintile, on average.”

I am also wondering what is the date of the walkability data, compared to the CCHS data (the 2 cycles from 2007 to 2011). Is there a big-time difference between the walkability data release and CCHS cycles? please elaborate and mention the limitations if any.

The Walk Score data are from 2014, so there is a time difference of several years. We have mentioned this difference in the Strengths and Limitations subsection of Discussion: *“there was a time lag between the collection of height and weight data from the CHMS in 2007-2011 and calculation of Walk Score® values in 2014. However, major changes in Walk Score® quintiles are unlikely to have occurred during this time gap, so we do not expect the time difference to impact the results”*

VERSION 2 – REVIEW

REVIEWER	Rania Wasfi Universite de Montreal, Canada
REVIEW RETURNED	05-Nov-2019
GENERAL COMMENTS	Thank you for addressing my earlier comments, a great contribution to this research area.