Author’s response to reviews

Title: Outdoor Advertising, Obesity, and Soda Consumption: A cross-sectional study

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Version: 2 Date: 26 October 2012

Author’s response to reviews: see over
Dear Reviewers,
Your comments were very helpful in improving our paper. Please see our responses below. We have made substantial revisions to our paper with your comments in mind. Thank you again for the time you took to make many detailed comments.
Sincerely,
Lenny Lesser

Reviewer's report
Title: Outdoor Advertising, Obesity, and Soda Consumption: A cross-sectional study
Version: 1 Date: 30 July 2012
Reviewer: Bridget Kelly
Reviewer's report:
This is an interesting paper and concept. My main comment is that more information is required to describe how exactly the modeling/simulation of the impact of advertising on obesity / soda consumption was done. The conclusions and policy implications are valid and useful.

Major revisions
1. The limitations of the study should be further elaborated. What are the implications of only asking about soda consumption for one day (i.e. not usual intake, seasonal variations)? What is the predicted effect of using self-report weight and height? How do the authors suppose these limitations would affect the results?
   Self reported dietary recalls are always subject to bias. However, 24-hour recall seems to be better than food frequency questionnaires. We've added a description of this to the discussion. In addition, we added a section on self-reported height and weight to the discussion. In the section, we talk about how weight is often underreported, and how our results may be biased towards the null. We added a discussion of how these limitations would affect our results.

2. Methods, paragraph 6: I agree that most outdoor food advertising is unhealthy and therefore it may have been acceptable to group all food ads together rather than distinguish healthy vs. unhealthy products. However, this is not well justified in the paper. Further evidence and citations are required. Saying that “most experts would consider...” is inadequate.
   Our data revealed that less than 5% were for fruits, vegetables, or other “healthy” foods. The large majority of the ads were for restaurants, drinks, and snack foods, which are all associated with poor health. Because the prevalence of healthy ads was so low, excluding them are unlikely to change our results significantly.

3. Methods, paragraph 7: While a greater proportion of ads for food may mean that these dominate the advertising landscape, the use of proportion rather than actual rate or counts of ads can be misleading if there are small numbers of ads overall. E.g. if 100% of ads for food but there are only two ads, then the use of % is meaningless. This needs to be clarified in the paper and effort made to
demonstrate that this was not the case in the current study.

In our regressions we controlled for the total number of ads (food and non-food) in an attempt to control for the overall market size of the census tract. If an individual lives in a small, dense census tract, than 2 ads may actually have a large effect. We chose the percentage of ads variable based on our conceptual model of how an individual sees an ad. (See our response to reviewer 3, number 2.) We had several conversations with a marketing professor who has worked in this area, and we believe that the percentage-based variable is the correct one. Even if it is not the “correct” variable to use, our study shows that this is some association between this variable and obesity. Further studies will have to confirm our study and describe other ways of looking at this association.

4. More detail is needed to describe how this interesting simulation was done to predict obesity and soda intake depending on food advertising predominance. Thank you for urging us to explain the econometric simulation further. The simulation was done with STATA’s prvalue post-estimation command. We added a different, and hopefully more comprehensible, explanation of this in the revised methods section.

Minor revisions
5. Abstract: specify that the telephone survey was conducted on adults, and give the age range.
   We added age range to abstract.

6. Intro, paragraph 1: There are some estimates that TV advertising accounts for approximately 2% of the variance in obesity. This literature should be referenced.
   Thank you for suggesting a further citation. We presume you are referring to Ritchey’s 1983 article. We have decided not include it because it is unclear if the value of “2%” in 1983 is relevant to today’s attributable risk. Additionally, Ritchey’s paper focuses mainly on television and children, while our focuses on adults and outdoor ads. However, we have added several other pertinent references to our introduction and discussion.

7. Intro, paragraph 3: as well as energy and sugars, high fat and sodium are also of concern. A reference for the statement about differences in obesity prevalence by SES/race is needed.
   We added a reference for the obesity disparities. We also changed the sentence about food advertising to make it more general.

8. Methods, paragraph 9: is this usual in the USA to designate ‘other’ ethnic groups as ‘non-minority’? I assume this group is made up of many different ethnic minority groups.
   It is likely that those that characterized themselves as “other” are of mixed race, and it is not clear how to characterize them. However, none of the census tracts had this as the predominate race, thus it did not effect our results. We have also eliminated the
problem of describing “minority” by listing all of the predominant races. (See response to reviewer 2, comment 4).

9. Results: query if the reporting of decimal places is necessary as in many cases the numbers being referred to are small. We are happy to delete the decimals. We defer to the editorial policies of the journal for how many decimals to use.

10. Results, paragraph 3: mixing word “The median household income…” We have corrected this.

Reviewer's report
Title: Outdoor Advertising, Obesity, and Soda Consumption: A cross-sectional study
Version: 1 Date: 6 August 2012
Reviewer: Keryn Pasch
Reviewer's report:
Outdoor Advertising, Obesity, and Soda Consumption: A Cross-Sectional Study
This manuscript describes a study that explores the association between outdoor advertising of food and beverage products and obesity and soda consumption among adults in two cities. This manuscript addresses an area of research that has been understudied, outdoor food and beverage advertising; however there are some concerns as outlined below.

Major Compulsory Revisions
1. The introduction would be strengthened by additional background on the importance of advertising and why outdoor advertising may be important.
   We added a paragraph with several references, pointing to the role of advertising in promoting food consumption. We comment that most of the attention has been paid to television advertising, and that outdoor advertising may play a unique role.

2. The main survey method for the present study is the use of telephone survey, while the response rates are similar to the BRFSS, this needs to be included in the limitations of the study as those who did not participate and those do not have land line telephones were not included in this study and this may be a very different group than those who participated.
   Sample response plays a role in any study of this nature. While we approached the rates of the BRFSS, there is always the possibility of bias. We added a discussion of this in the discussion section and included a new reference.

3. Please discuss the length of data collection in the limitations section. Given the likely changing nature of the outdoor advertising environment, can data collected a year apart be compared? Were the census tracts randomly selected for data collection, if not would there be any systematic bias?
   We added the time frame of the interviews to the methods section. The interviews took place at the same time as billboard studies. Therefore, we would assume that
responses to the surveys over time would correspond to the advertisements over that time period. As indicated in the methods section, the tracts were randomly selected from an area that was feasible for the study. We added more to the 2nd to last paragraph of our limitations to discuss the time issue.

4. Is there a rationale for including Asian and Other in non-minority?
   Thank you for bringing to our attention the role of Asian race when looking at minorities. When we reclassified Asians as “minority” the relationship between race and ad placement strengthened. Nonetheless, we decided to separate out all the races in a revised table, so that readers could make those judgments themselves. Please see the revised table II.

5. The discussion section of the manuscript could be strengthened by putting the findings in context of other types of food and beverage advertising as well as other types of outdoor advertising.
   We have added several references and further expanded the discussion.

Minor Essential Revisions
1. In the abstract, please include that this study was conducted with adults
   This is now included in the abstract.

2. Throughout the manuscript, please refrain from using causal language as this study is cross-sectional and cannot determine causality
   We updated some of the words to “association.” We kept the words “predict” in the summary of the simulations, as simulations are hypothetical prediction models.

3. Please include the comparison group in the study purpose sentence in the background section. Additionally, the study purpose as written sounds like the comparison will be made with those in areas with high advertising to those in areas with low advertising, but I believe from the methods and results sections the advertising variable is continuous.
   We modified the purpose statement (last sentence of the background) to add the comparison group. We believe the sentence allows for the interpretation as a continuous variable.

4. In the first sentence in the statistical methods section, please clarify that self-reported height and weight were used to create BMI categories.
   We added this.

5. Please include a citation for the sentence that states that percentage-based measures are useful because the effect of advertising is reduced when it must compete with other advertising.
   Thank you for bringing this to our attention. We have searched the literature and not found many studies that look at this effect of advertising. This statement is part of our theoretical model of how we sought to analyze this study. There are many ways to
analyze the effect of advertising. Please see our responses to other reviewers on this issue.

6. Is there a reason for not including other foods, like fast food, which is prevalent in outdoor advertising in the current study? If fast food was included on the survey, its addition would add to the current manuscript.
   Fast food was indeed included. We added the words “all types” to make this clear.

7. Why were age in years and years squared both included in the model?
   Thank you for asking about the age variable. We have found that in just about any regression involving a meaningful age range, age alone does not provide a good fit. We always include both age and age-squared to capture these non-linear effects. It improves model fit to have age-squared. We added a short statement about this in the methods section.

8. Did the models associating food advertising and soda consumption also control for other variables such as BMI, etc.?
   Our soda model did not control for BMI, as were looking at the direct association between soda drinking and advertising. There is an association between BMI and soda in our model, as expected. However, adding BMI to the model does not appreciably affect the results.

9. In the discussion section, the paragraph on previous outdoor research could be revised to include better transitions throughout. Also, the citation for Pasch et al is not correct, alcohol advertisements predicted increased alcohol intentions not alcohol consumption.
   We have corrected the citation and added some words to join the paragraph together.

10. Please provide examples of other unmeasured variables that could explain the associations found in the present study.
    Unmeasured variables are an important component of these types of studies and cannot be completely controlled for. We have added some discussion of this issue in the discussion section.

11. The final paragraph of the manuscript seems out of place.
    In the final paragraph, we attempted to give potential policy implications to public health. We have revised it to an improved version.

12. On table 4, please clarify the title so that the exposure and outcome are clear.
    Thank you for this suggestion. We have changed it.

Reviewer's report
Title: Outdoor Advertising, Obesity, and Soda Consumption: A cross-sectional study
Reviewer's report:
This is a well-conceptualized and well-written manuscript. The research question—whether there is an association between outdoor food ads and obesity—is clear and important. Most of the research on outdoor advertising has only described demographic patterns in the location and content of ads and not connected ads to health outcomes. Even though this research cannot show a causal link, the evidence that there is an association represents an important contribution to the public health literature.

The authors used a unique data set including directly observed outdoor ads and a telephone survey with residents living in those same areas. The authors provide clear results and discussion sections and identify many of the limitations to this research.

Minor essential revisions
The one limitation the authors fail to acknowledge is that of self-selection bias. This issue has received substantial attention in the neighborhood effects literature. Is self-selection bias relevant to the association the authors found? Do propensity scores offer a means for controlling for this potential bias?

We addressed selection bias in our revised discussion section. Self-selection is always a problem in this type of study. However, it is hard to see how people would self-select into areas specifically for their food advertising. We would still liked to have accounted for this possibility in some way. Propensity scores are an interesting idea, but we do not feel like we have enough data or variables for a propensity score analysis.

The main independent variable used was the percent of ads that were for food. This treats all ads as equal, regardless of size, correct? The authors might consider a measure that looks at percent of ad sheets (consistent with Yancey et al 2009) since this may better reflect exposure.

Thank you for bringing up the issue of the correct variables. As stated in the Yancey paper, the number of ads can be skewed because: “Advertisers, however, are willing to pay more for a large billboard than for a small window poster because they know that large billboards are likely to reach more people.” In our study we were interested in the perspective of one individual viewing an advertisement. Billboards and bus stop ads may have the same effect on an individual because the larger advertisements are seen for a shorter period of time (while driving), where the smaller ones may be seen for a longer period of time (while walking). Because we are interested primarily on the impact of ads on people living in the neighborhood, we believe that the percent of ads is a better measure than the percent sheet space. We added this information to the methods section. Additionally, we spoke to a marketing professor who has performed research on this subject for many years and was an author on the Yancey paper. He agreed that the correct measure for this study was percent ads.

Were there meaningful differences between outdoor ads in LA and New
Orleans? Do those two cities have different local regulations about signage?

Thank you for raising this issue. We are not aware of any difference in laws between the two cities. Most of the laws involving advertising are within smaller localities than a city. Researching the laws of different sub-geographic areas was beyond the scope of this study. We went did find a significant difference in the proportion of food ads between the two cities (15% in NOLA, vs. 0.6% in LA), but LA actually had more total ads on average per census tract (6 in NOLA vs 14 in LA). These differences are likely due to more advertising space being available in LA, and more focus on entertainment ads in LA, due to the city’s focus on entertainment. Similar results were found in Yancey’s referenced paper. We added this information to the results and discussion.

Opening sentence: “Obesity is one of the world’s most intractable worldwide health problems.” World should not appear twice (world’s and worldwide)

Thank you for this suggestion. We eliminated the duplication.

Third paragraph “Given that food marketing predominantly promotes foods that are high in calories and added sugars.” This needs a reference.

We included a new reference for this.

Discretionary Revisions

The authors acknowledge the limitation of using census tracts of residence as the measure of exposure, but they don’t discuss why they used this measure. Use of census tracts is usually a practical consideration because finer scale geographic data are not available. However, because they have GPS coordinates for the ads, they could have used some form of density measure based on the proximity of survey respondents’ homes (if they have home address for respondents). Also, the authors acknowledge that places where people spend time may be as relevant to exposure as home address. Could they suggest some additional questions to ask in future surveys to capture such exposure, such as how much time survey respondents spend at home, in their neighborhood, and in other locations?

We did not have GPS coordinates of individual respondents. The possibilities for future research you suggest are interesting, and we have added them to the discussion.