Author's response to reviews

Title: Variation in the effects of family background and birth region on adult obesity: results of a prospective cohort study of a Great Depression-era American cohort

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Version: 3 Date: 4 March 2015

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Revision Memo

Variation in the effects of family background and birth region on adult obesity: results of a prospective cohort study of a Great Depression-era American cohort

March 3, 2015

We thank the reviewers for their further comments on our manuscript. In this memo, we describe how we have addressed each comment in the second revision of our manuscript.

Response to Reviewer 1:

1. Multilevel logistic models should be used.

We have considered using multilevel models in the analysis, but the small number of regions made it inadvisable to fit such models, due to the risk of biased estimates of Level 2 standard errors (Maas and Hox 2005). We note this limitation in our revised discussion on p. 17. When we attempted to fit a multilevel model to these data, the intraclass correlation in the unconditional model was 0.007 when examining obesity among women ages 50-61. This low intraclass correlation means a multilevel logistic model would not represent the clustering of obesity better than an ordinary logistic model (Raudenbush and Bryk 2002).

2. Regional effects now persist at older ages among women, whereas this was not the finding in the initial submission.

In our initial submission of this manuscript, we had used a multinomial logistic regression model, which compared obesity to normal weight. After incorporating the first round of reviewers’ comments, we had switched to a logistic regression model comparing obese respondents to a reference group including both normal weight and overweight respondents. This change explains the persistence of birth region variation in women’s obesity risk into late adulthood (as shown in Table 3). We did not discuss this change in the text because we agree with the first round of comments that a simple logistic regression (which shows a persistence of this effect into late life) is more appropriate for this analysis.

3. The link to the Great Depression is tenuous.

We have clarified in the text that, in the context of our study, the Great Depression is important because it was known to generate regional variation in certain characteristics of the birth region (pp. 6-7). In our revised discussion (p. 15) we address the consequences of regional variation in early-life environments for later-life obesity, but do not speculate about how the specific effects of the Great Depression have produced this variation, as the latter question is beyond the scope of our study.

4. Regional ethnic differences were not addressed in the paper.

Because of the unique historical circumstances of our cohort, we have focused on birth region
characteristics that were linked to the emergence or outcomes of the Great Depression (p. 6). We note in our revised discussion (p. 17) that there exist other compelling regional characteristics, including ethnic composition of regions, which may affect adulthood obesity risk. With the growth of racial/ethnic diversity in America’s population, this is an important factor to consider when extending our question to more recent cohorts.

5. *Other examples of maternal education influencing health-related outcomes should be given.*

In our revised discussion section, we connect our findings to the literature investigating maternal education effects on health risks and health behaviors that may be relevant to children’s obesity trajectories (pp. 14-15).

6. *Units for continuous variables should be shown in Table 1, and medians and IQRs should be presented.*

We have revised Table 1 to show units of measurement for birth date, educational attainment, income, and net worth, with the distribution of these variables summarized using medians and interquartile ranges (IQRs).

7. *There was a typo in the second paragraph of the text.*

The typo was corrected.

**Response to Reviewer 2:**

1. *The relationship between birth region and obesity should be shown after adjustment for all individual and regional covariates.*

In Tables 2 and 3, we estimate birth region variation in obesity risk controlling for early-life demographic and socioeconomic conditions (Model 1) and also controlling for late-middle life sociodemographic and health factors (Model 2). Our focus in these tables is to examine whether birth region variation in obesity risk is mediated by late-middle life sociodemographic and health factors, and whether birth region variation in obesity risk persists into late life. In answering this question, we are interested in the overall differences between regions, rather than residual differences after controlling for some region-level mediators.

In Table 4, we consider whether specific regional characteristics are significantly correlated with women’s obesity risk net of all individual-level covariates that were presented in Tables 2-3. (In revising Table 4, we have placed the manufacturing and non-manufacturing employment indices into the same model, and omitted the total employment index because it is a weighted average of these two variables.) Table 4 identifies per capita income and infant mortality rate as significantly correlated with obesity risk when added individually to the model controlling for individual covariates. We add these two characteristics simultaneously in Model 5 of Table 4. In Model 6 of Table 4, we consider forcing all available regional characteristics into the same model. As we only have 9 regions, however, Model 6 suffers from the problem of overfitting. Reflecting the inappropriateness of forcing all regional covariates into one model, a likelihood
ratio test reported on p. 13 indicates that this does not improve model fit beyond that attained by Model 5. Therefore, we consider Model 5 to be the more relevant description of regional influences on women’s obesity risk in adulthood.

References:
