



Lifecourse socioeconomic position and 16 year body mass index trajectories: Differences by race and sex



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ABSTRACT

Objective. The aim of this study is to evaluate the association between lifecourse socioeconomic position (SEP) and changes in body mass index (BMI), and assess disparities in these associations across racial/ethnic groups.

Methods. With longitudinal data from 4 waves of the Americans' Changing Lives Study (1986–2002), we employed mixed-effects modeling to estimate BMI trajectories for 1174 Blacks and 2323 White adults. We also estimated associations between these trajectories and lifecourse SEP variables, including father's education, perceived childhood SEP, own education, income, wealth, and financial security.

Results. Blacks had higher baseline BMIs, and steeper increases in BMI, compared to Whites. Childhood SEP, as measured by high father's education, was associated with lower baseline BMI among Whites. High education was associated with a lower baseline BMI within both race and sex categories. Income had contrasting effects among men and women. Higher income was associated with higher BMI only among males. Associations between indicators of SEP and BMI trajectories were only found for Whites.

Conclusions. Our study demonstrates that lifecourse SEP may influence adult BMI differently within different racial and sex groups.

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Introduction

Despite widespread recognition of racial/ethnic and socioeconomic disparities in obesity, little is currently known about how race/ethnicity and socioeconomic position may be associated with long-term changes in BMI. Most reports of changes in BMI over time among adults involve the analysis of repeated cross-sectional surveys, allowing only for the examination of secular trends in obesity, weight, or BMI (Flegal et al., 2010; Ljungvall and Zimmerman, 2012). Such designs do not allow for analysis of changes in BMI within the same cohort; thus, factors associated with disparities in increases in BMI across racial/ethnic groups within the adult U.S. population have not been studied extensively.

Etiologic research into Black/White racial disparities in BMI suggests that differences in socioeconomic position (SEP) may account for disparities in obesity (Kahng, 2010; Ljungvall and Zimmerman, 2012). A general focus on SEP, however, may be an oversimplification, as SEP is

a latent concept which indicates an individual's position in a given social stratification scheme. Moreover, SEP is also known to influence health over the lifecourse, such that health status in later life is a function of a lifetime's worth of exposure to the influences of SEP. In fact, studies have shown that childhood SEP affects adult BMI status independently and in conjunction with adult SEP (Giskes et al., 2008).

Objectively diverse measures of SEP—such as income, education, or wealth—may be differentially influential in specific racial-ethnic subgroups and among men and women (Braveman et al., 2005). Recent literature suggests that when the exposure of interest is a social variable such as SEP, stratification by race may yield disparate associations among racial groups (Kaufman and Cooper, 1999; Kaufman et al., 1997).

In order to advance our understanding of the influence of SEP on adult BMI within Blacks and Whites, we adopt a lifecourse perspective by estimating individual patterns of BMI over an extended period of time (i.e. trajectories), and by assessing how these trajectories are associated with both childhood and adult SEP. In particular, the objectives of the study were to:

- estimate racial differences in BMI trajectories in US men and women;
- explore racial differences in associations between different

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components of lifecourse SEP and BMI trajectories among US men and women.

Methods

Subjects

The study utilizes data from four waves of the Americans' Changing Lives (ACL) study, conducted initially in 1986 (W1), with follow-up interviews in 1989 (W2), 1994 (W3), and 2002 (W4) (House, 2008). The first wave of the ACL involved a multistage, stratified area probability sample of non-institutionalized adults aged 25 and older and collected data from 3617 participants. Because the focus of the survey was differences between Black and White Americans in middle and late life, Blacks and people aged 60 and older were over-sampled, with a household response rate of 68% at W1. The response rates for the next three waves were 83%, 83%, and 74%, respectively, for each wave, among the surviving respondents (Fig. 1). Death rates in the ACL sample are largely equivalent to national estimates for the study period (Houle, 2013).

Measures

The dependent variable in this study was body mass index (BMI), a time varying continuous measure calculated by dividing self-reported weight in kilograms by self-reported height in meters squared. Time was measured in years since baseline at 1986. Covariates such as gender, age, height and number of children were reported at baseline and analyzed as potential confounders in all models:

We assessed lifecourse SEP by measuring SEP in childhood and adulthood using variables described in Table 1. Childhood SEP was assessed at W2 and consisted of two variables: respondents' father's completed education (high school or more compared to less than high school) and perceived childhood socioeconomic status (average/higher vs. low compared with an average family in the community at the time the respondent was growing up).

Adult SEP was assessed over several waves and consisted of 4 variables including education, income, wealth and financial security. Completed education (high school or more compared to less than high school) was assessed in W1. Family income was assessed in all 4 waves (continuous, time varying). Because

income was only reported as a categorical variable in W1, we used mid-points of each respective category as the respondent's income for the continuous measure for that year. To facilitate comparison across time, income was adjusted for inflation using the Consumer Price Index so that income at each time point represented value in 1986 dollars. Log transformed values were used in the regression analyses.

Wealth (continuous, time varying) was assessed in all 4 waves as a 7 category ordinal variable and was based on reported values of real estate, value of business or farm, retirement accounts, savings and investments, one or more cars, and other assets. After assessing the linearity of wealth in association with BMI in bivariate analysis, we included wealth as a continuous variable in the multivariable models. Finally, an index of financial security (continuous, time varying) was constructed from three survey questions pertaining to a subject's financial situation asked in each of the four waves: Higher scores on the resulting scale reflect more financial security (Cronbach's alpha = 0.81).

Statistical analyses

We employed inference by multiple imputation to address uncertainty due to missing values caused by attrition as well as arbitrary item non-response. The underlying imputation model was a multivariable normal model with unstructured covariance matrix to preserve the longitudinal aspect of the study. SAS procedures PROC MI and PROC MI ANALYZE were used for computations (Yuan, 2011). To assess the impact of missing data on the uncertainty measures of the substantive models, we looked at the rate of missing information (Rubin, 2009). All models had relative efficiencies greater than 0.90, which suggests that the number of imputations was sufficient to achieve stable estimates (Rubin, 2009). Our statistical inference employed mixed-effects models to accurately incorporate the repeated measures into the estimation of standard errors and to model change over time while estimating the individual characteristics' impact on this change. As the longitudinal outcomes tend to be correlated with heterogeneous variation over time, mixed-effects models have been a popular tool to incorporate this structure into the inference. To compare racial differences in trajectories of BMI and predictors of such trajectories all analyses were stratified by race (Blacks and Whites). We centered time invariant variables at the mean and time varying predictors at the year of first wave of

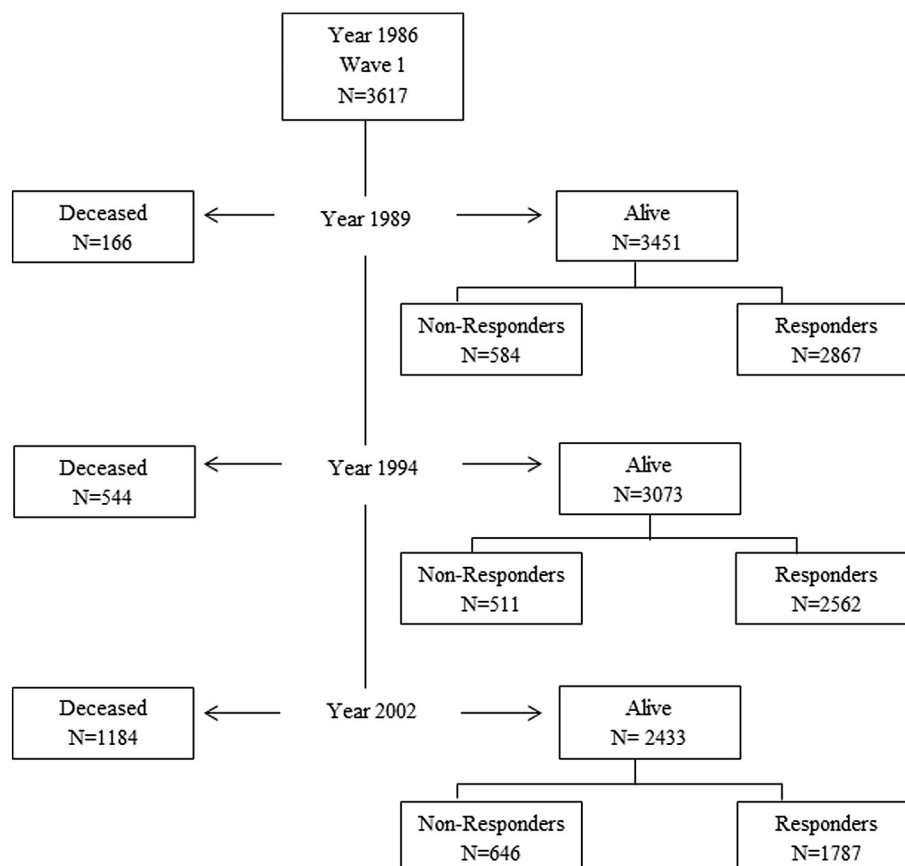


Fig. 1. Americans' Changing Lives study (1986–2002)—survey design and response rates.

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