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Distinct Elements of a Multidimensional Measure of Young Adult SES Differentially Predict Obesity across Race/ethnicity

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TOPIC DESCRIPTION AND THEORETICAL FOCUS

The higher rates of poor health among racial/ethnic minorities in the US are a significant public health concern. Although these disparities in disease rates have been well documented, we still do not fully understand why gaps persist, and are in some cases widening. As noted by Williams [1], "An understanding of the determinants of the differential distribution of health problems among racial or ethnic groups is a prerequisite to the development and direction of effective programs and services to address them." There is a strong need to go beyond the social constructs of race and ethnicity to identify specific socioeconomic, demographic and contextual factors which can serve as intervention targets to reduce disparities in health outcomes.

This paper focuses on the study of racial/ethnic differences in the influence of socioeconomic status (SES) factors on young adult obesity, an increasingly critical health outcome in the US and worldwide. Using data from the National Longitudinal Study of Adolescent Health (Add Health), we contribute to the disparities literature with detailed work on understanding the role of SES in racial/ethnic inequality in obesity across the transition to adulthood. This transition is an important and potentially revealing period for study due to the rapid development of obesity and the dramatic increase in racial/ethnic disparities in obesity observed during this stage in the life course. Although the complexity of this demographic transition presents a challenge in accurately defining young adult SES, better specification of this measure across the transition to adulthood provides greater insight about racial/ethnic differences in the effect of specific SES factors on obesity development during this crucial time. Thus, our goal is to investigate the influence of well-defined SES measures during young adulthood on differential distribution of young adult obesity across racial/ethnic groups.

The transition to adulthood has particular salience for the study of racial/ethnic differences in socioeconomic determinants of obesity; in addition to a substantial amount of weight gain between the ages of 20 and 40 years[2, 3], racial/ethnic disparities in obesity trends increase dramatically during this period. Obesity itself has become a significant public health problem, being among the top modifiable risk factors for cardiovascular disease and diabetes, and linked to many additional adverse health outcomes[4, 5]. Obesity prevalence in the US has increased dramatically over the last three decades in all age groups,[6-10]particularly among racial/ethnic minority groups.[11] Lower socioeconomic status (SES) is associated with higher disease burden, and since ethnic minorities remain disproportionately represented in lower SES groups [12], racial/ethnic differences in SES are often investigated as an explanation for ethnic disparity in obesity trends [13, 14]. However, the relationship between SES, race/ethnicity, and obesity is far from clear [15], particularly in young adulthood. For example, obesity is higher among ethnic minority young adults, even when matched with whites on SES factors [14, 16]. In addition, several studies document an inverse relationship between SES and obesity for whites but not Blacks. [17-21] .

In our study of the inter-relationships between race/ethnicity, SES and obesity, we avoid the relatively routine practice of statistically adjusting racial differences in health for socioeconomic indicators to determine the extent to which SES "explains" racial differences, because inadequate or improper specification of SES can bias estimates and their inference towards independent effects of race/ethnicity which have the danger of being interpreted as "biological" effects of race [1, 22, 23]. Further, there are racial differences in quality of education, wealth associated with a given level of income, employment stability and the health risk associated with socioeconomic status [1], as well as non-economic factors linked to race that affect health, including individual and institutional racism, migration, and acculturation [24]. The analytic strategy of this paper avoids such conceptual pitfalls by examining racial/ethnic differences in the influence of SES factors on obesity.

However, conceptualizing the inter-relationships between race/ethnicity, SES and obesity during the transition from adolescence to adulthood has its own pitfalls that this study aims to address. This complex period is characterized by multiple transitions in residence, employment, schooling and social roles (e.g. marriage or parenthood), all of which have bearing on the SES of the young adult. This work in a relatively younger (mean age approximately 22 years) "young adult" study population is further complicated by evidence from recent studies in the US which suggest that a number of the "traditional" transitions are being delayed by an increasing proportion of the young adult population; indeed, the point in life at which a young person becomes an adult has been blurred and largely postponed [25]. Furthermore, most of the work on demographic transitions has been done on whites, with a small subset of research contrasting transitional processes of black and white Americans; relatively little work has been done on US Hispanics and Asians.

A final challenge addressed by this study is the definition of SES. SES is a global, multidimensional attribute comprising several domains, reflecting differential access to resources and a measure of relative position within a hierarchy (e.g. status, rank, social class). However, relatively little work has focused on defining SES, operationalizing existing definitions, or evaluating the properties of measures [26], leading to a lack of consensus on an theoretically sound definition [27, 28]. Studies have assessed SES with a wide variety of indicators, most often household income or years of education, or less frequently, occupation [20]. Extending the work of Oakes and Rossi, we view SES as a complex measure comprising three major domains -- material capital, human capital and social capital, which uniquely locate the status of individuals in the social structure, but within which there are likely to be further dimensions that may be uniquely important during different life course stages [26]. This study defines a material capital domain that captures the tangible materials that are owned by individuals, going beyond earnings and income to include material endowments of all sorts (e.g. homes, cars, and other sources of wealth; income stocks and flow, etc.), because all such capital may be important for acquiring good housing, health care or education, which may all play a role in obesity-related behaviors. Human capital comprises both innate fixed endowments as well as the education, skills, abilities and knowledge they may acquire, all of which may have plausible links to behaviors linked to obesity. The social capital dimension captures the ability of individuals to secure benefits by virtue of their membership in social organizations, networks and other social structures, and indeed there exists a nascent literature on the relationship between characteristics of social networks and weight status [29]. The study of the relationship of SES to obesity can be greatly enhanced by the consideration of all of these domains of this social construct, and thus we will aim to capture as much of this multidimensionality as possible in the proposed research. Furthermore, it is likely that unique dimensions within the three major domains of SES will be of particular importance during the complex transition to adulthood, since, as we have already mentioned, traditional SES measures may have little meaning among young adults in the US today, for whom "becoming an adult" has been delayed. Finally, we expect to gain deeper insight into our ultimate goal to identify racial/ethnic differences in the effect of SES on obesity, since we hypothesize that specific components or dimensions of SES may differentially impact obesity status by race/ethnicity.

DATA AND RESEARCH METHODS

Overview of survey design and sample

Add Health is a longitudinal, nationally representative school-based study of the health-related behaviors of U.S. adolescents. Surveys of students, parents, and school administrators were collected to examine the causes of these behaviors, with an emphasis on the influence of social context. Researchers selected a random sample of all high schools in the U.S. stratified by urbanicity, school size, and school type, and more than 90,000 adolescents were initially surveyed during an in-school component. From this, adolescents were selected for a core sample, representative of adolescents attending public, private and parochial schools in grades 7 to 12 during the 1994-1995 school year. Special samples were added to enhance representation of disabled youths, non-Hispanic blacks with a college-educated parent, Chinese, Cubans, Puerto Ricans, and siblings of various levels of relationship. Thus far, three "waves" of in-home survey data have been collected: Wave I (1994-

1995) was conducted with 20,745 eligible participants from the sample that completed the in-school survey, Wave II (1996; N=14,438 eligible adolescents) followed up those participants still enrolled in high school after a one-year interval, and Wave III (2001-2002; N=15,197) was completed on eligible original Wave I participants (regardless of participation in Wave II), now in their young adult years (18 to 28 years old). The sample for this analysis was drawn from the Wave III study population, of whom approximately 17% were currently married at the time of assessment; 20% had children, independent of marital status. Almost all completed high school; approximately 33% were currently in college, and 52% had ever been to college. The vast majority had successfully entered the labor force, working at least part-time.

Analytic Strategy

Overall, the analytic approach to this research question was first to use factor analysis to define young adult SES in a manner that maximizes its multidimensionality, and then to investigate race/ethnic differences in models of obesity for this definition of young adult SES. Specifically, we used exploratory factor analysis to uncover the latent structure among a large set of potential indicator SES variables. This variable set included measures of education, labor market experience, personal economics, wealth, information and financial access, and indicators of hardship, including receipt of public assistance. Since our intention was to detect the non-dependent structure in the relationship between variables, we used the principal factor analysis (PFA) method, which seeks to find least number of factors that can account for the common variance of a larger set of young adult SES variables, excluding variable-specific (unique) variance. Because factor analysis utilizes the correlation structure between variables based on the values from individuals in the sample, we applied appropriate sample weights to the factor analysis procedure to reduce bias in our estimates due to the oversampling of certain individuals that was part of the survey design. We then generated factor scores for each individual from the rotated factors; these scores locate the young adult with respect to a given factor by calculating the "weighted sum" of each individual's score on each variable multiplied by the corresponding factor loading (correlation coefficient between the variable and factor) of the variable for the given factor.

Initial modeling of the association between SES factor scores in Poisson regression models of young adult obesity prevalence included testing of conceptually plausible interactions with the factor scores in association with young adult obesity as well as assessment of confounding by measured covariates. The final statistical model was gender-stratified and assumed that young adult (Wave III) obesity was a function of the exogenous characteristics of race, age and the newly created young adult SES measure, a collection of uncorrelated factor scores, as well as lagged (adolescent) obesity status. Since the ultimate goal of this work was to model the association of this newly-created measure of young adult SES with young adult obesity and to compare that association across race/ethnicity, we created young adult SES factor scores in the "pooled" race/ethnic sample (i.e. that sample that includes all racial/ethnic groups), though we fully expected these factor scores to differ by race. We then explicitly compared these pooled-sample factor scores across race/ethnicity, including comparisons of both the univariate distribution of these factor scores in each race/ethnic group as well as the performance of these scores in predicting obesity in models with race/ethnic variables included as main effects and interaction terms to facilitate explicit testing of race/ethnic differences in the effect of young adult SES factors on obesity.

PRELIMINARY FINDINGS

Six young adult SES factors were extracted from a set of 47 potential SES indicators using the principal factor method, applying the Kaiser criterion (eigenvalues >1) and Scree tests to help determine the best number of factors. The original SES variable space was subject to a Varimax rotation to maximize the variance of the factors while minimizing the variance *around* the factors, and a horst normalization was applied to reduce the weight of rows or variables with high initial loadings. Factor scores were then generated from these rotated results using the Bartlett (weighted least squares) scoring method. The young adult SES factors (or "dimensions") were named based on descriptive interpretation of the patterns of highly loading variables (factor

loadings >0.60) for each of the rotated factors, as follows: Social capital, current employment, public assistance, income, economic hardship, and current schooling.

Descriptively, substantial differences in the mean factor scores for each young adult SES dimension were observed by sex and by race/ethnicity. That is, the average position on each factor (relative to the study population on which the factor analysis was performed) differed across groups, suggesting that SES has different meanings across these social categories. Of particular note are the consistently low scores for all racial/ethnic groups among males for the public assistance factor, while all but asian females showed high scores for this dimension, especially black females. In addition, black and Hispanic male had highly negative scores for the SES factor we called social capital, whereas black females had positive scores, and Hispanic females were only slightly negative.

Differences in the association between young adult SES factor scores and obesity were observed among females, but not males, and only in the two "negative" SES dimensions we extracted, i.e. only for the public assistance and economic hardship factors. High positive scores on public assistance (i.e. those who scored highly on the pattern of variables describing the receipt of assistance) were associated with significantly higher obesity in Asian (RR=1.76; 95%CI: 1.18, 2.64), but less so in white (12% higher) females, but not at all in black or Hispanic females. In contrast, high scores on economic hardship were associated with significantly higher obesity for Asian and Hispanic females only (13-46%). Among males, however, we did not observe racial/ethnic differences in the effect of any SES factors on obesity, nor did we observe any significant effects of SES dimensions on obesity at all for any racial/ethnic group among males. The significant racial/ethnic differences observed in females could suggest a differential adaptation to adverse SES conditions by race/ethnicity. However, we would make further interpretations of the direction of adaptation for different groups with caution, particularly since null effects of these negative SES dimensions were observed in racial/ethnic minority groups (among blacks and Hispanics for public assistance, and among blacks for economic hardship). In addition to a lack of independent effect of young adult SES factors on young adult obesity, these null effects could possibly reflect that the influence of such adverse SES conditions may have been exerted at an earlier time and thus have been captured by our control covariate measure of adolescent obesity among these racial/ethnic minority groups. The lack of significant differences by race/ethnicity among males is perhaps less important than the lack of effect of any young adult SES dimension on obesity risk, suggesting that the risk for obesity or obesity related behaviors during young adulthood are less sensitive to the influence of SES factors for males than they are for females. Overall, identifying which SES dimensions are important predictors of obesity in young adulthood, as well as those dimensions for which the effect on obesity differs by race/ethnicity can provide salient information for efforts to reduce the current trend of widening racial/ethnic disparity in obesity.

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