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Wealth and Obesity Among U.S. Adults Entering Midlife

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Objective: This study examines the relationship between wealth and obesity among adults entering midlife and whether this relationship varies by gender, race, and measure of wealth.

Methods: The data were obtained from the National Longitudinal Survey of Youth 1979 (NLSY-79). Population-averaged models were used to examine the associations between multiple measures of wealth and obesity among 6,979 respondents while controlling for education, occupation, income, and relevant sociodemographic variables.

Results: The analysis found a robust association between wealth and midlife obesity as well as heterogeneity in the wealth-obesity association across gender, race, and measure of wealth. With the exception of Black men, net worth generally had a significant and inverse relationship with obesity. The net worth-obesity association was largest among women and was driven primarily by home value—in addition to savings and debt for Black women. Although home value was significant for White men, the components of wealth were generally unrelated to obesity among men.

Conclusions: The association between wealth can obesity was generally robust but also complex, depending on gender, race, and measure of wealth. Research that does not consider multiple components of wealth may overlook the importance of economic resources in shaping obesity rates in the U.S. population.

Keywords: obesity, health disparities, socioeconomic status, SES, wealth, race, gender

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INTRODUCTION

Our current understanding of the relationship between socioeconomic status (SES) and obesity is largely based on education, occupation, and income, but for those entering middle adulthood (45 to 65 years old), wealth is a key indicator of SES and a correlate of health and obesity (1–4). Hajat et al. (1), for example, found that those in the lowest quintiles of wealth in their sample had a 40 to 89 percent higher risk of becoming obese than those in the highest quintiles. Although this growing area of research provides strong evidence of wealth-based disparities, we do not know whether different types of wealth are differentially related to obesity. To address this gap, this study examines the associations between multiple measures of wealth (i.e., total net worth, home value, vehicle value, savings, investments, and debt) and obesity using a nationally representative and longitudinal sample of adults during their transition into midlife.

Health disparities scholarship typically defines wealth as net worth. Net worth is a combination of five major components of wealth in the U.S., including the total value of one's home, automotive vehicles, savings, and investments minus the total value of one's debts. These components of wealth represent distinct material resources (5), and as such, they may have independent associations with obesity. Furthermore, research generally finds an inverse relationship between SES and obesity for women, but for men—Black men in particular—past research has found a null or even positive relationship (6–9). But these studies do not consider multiple sources of wealth, which vary considerably by gender and race. In our discussion below, we review these components of wealth in more detail and explain why each component has a potential social, behavioral, or psychological connection with obesity.

Housing wealth is the largest contributor to net worth and grows as a financial resource in midlife (4, 10). With respect to obesity, prior research has found that obesogenic environments (e.g., areas perceived as proximate to crime, heavy traffic, liquor stores, and fast food) are associated with lower property values, and property values are negatively associated with obesity and BMI (11–13). Rehm et al. (13) examined the assessed value of homes in a Washington county and found that women with property in the bottom quartile were 3.4 times more likely to experience obesity than women in the top quartile. Thus, prior research suggests that the value of one's home should be inversely related to midlife obesity.

Savings represent the most flexible source of wealth and may relate to obesity in a few ways. Savings can help in times of emergencies, e.g., illness or short-term unemployment, and thus reduce the stress and long-term, financial impact of these difficulties (14). The amount an individual has in their savings and checking accounts also provides information on individuals' excess money available to offset weight gain in later adulthood by purchasing, e.g., a gym membership or personal trainer. Savings may also represent unobserved, non-cognitive human capital with respect to self-control and future-oriented action (15), which are inversely related to healthy lifestyles and obesity (16).

Although investments can offer an additional source of income, their relationship with health and health behaviors is complicated. On one hand, stock owners during stock booms experience an improvement in their general physical and mental health and a reduction in blood pressure and heart disease (17). On the other hand, stock market crashes are associated with poorer mental health, increased hospital admissions related to psychological conditions, and risky health behaviors like binge drinking for those with investments (18, 19). Thus, investments may create a unique set of vulnerabilities and resiliencies with respect to obesity, especially for those who experienced the Great Recession of 2007 (3).

The value of one's car may provide further information on one's financial standing and social status beyond

what other components of net worth capture, especially for Black women and men. Although housing wealth is typically the most valuable asset of White households, almost all of the median wealth of single Black women can be attributed to their vehicles (20, 21). Thus, although cars represent a depreciating asset with fewer financial benefits than home ownership, vehicle wealth may still provide a useful indicator of SES.

Contrary to other components of wealth, debt is an emotionally stressful experience that has become a common occurrence over the course of the last twenty years due to increases in foreclosures, credit card overspending, and student loans (22, 23). For example, after adjusting for education and income, Münster et al. (24) found that debt increases the odds of obesity by a factor of 2.5. Thus, debt may provide additional insights into the relationship between obesity and financial insecurity in midlife for those with an absence of wealth (22).

METHODS

Participants

The data come from the National Longitudinal Survey of Youth 1979 (NLSY-79). The NLSY-79 is an ongoing longitudinal survey conducted by the U.S. Bureau of Labor Statistics. It began with a nationally representative sample of 12,686 U.S. women and men in 1979 (25). The survey still occurs biennially and includes information related to BMI, educational degrees, occupation, income, wealth, and other important covariates of obesity such as geographic residence and marital status.

When the NLSY-79 began in 1979, respondents ranged in age from 14 to 22 years old, but because our focus is on obesity among adults transitioning into midlife, we used the 1996, 2000, 2004, 2008, and 2012 survey waves. These waves include respondents ranging in age from 31 to 39 years old in the 1996 to 47 to 55 years old in the 2012 survey. The NLSY-79 did not ask questions about respondents' wealth in the 1998, 2002, 2006, and 2010 surveys.

We limited our analysis to non-Hispanic, White and Black respondents because of the limited number of Hispanic respondents, the characteristics of the Hispanic sample, and our interest in Black-White differences. The NLSY-79's cohort was taken prior to the large influx of Mexican migrants experienced in the 1980's through 2000's who make up approximately 63% of the Hispanic population (26). Thus, the NLSY-79's cohort of Hispanics does not provide an accurate representation of the current Hispanic population in the U.S.

Obesity

The NLSY-79 contains multiple measures of respondents' self-reported height and weight between 1981 and 2014. We used respondents most recently reported height and weight to create binary indicators of obesity (BMI $\geq$ 30) for each wave in the analysis sample. While measured height and weight are preferable, research indicates that self-reports are a reasonable proxy for measured height and weight (27). The BMI of women who were pregnant during the survey was set to missing.

Wealth

The NLSY-79 contains information on the value of homes; savings, stocks, investments, and bonds; businesses and farms; and vehicles in addition to money owed on real estate and vehicles and debts related to homes, cars, businesses and other lines of credit. Using this information, we created measures of total net worth and the five major components of wealth, including 1) the market value of respondent's home or apartment; 2) the market value of vehicles; 3) the total value of savings and checking; 4) whether the respondent had any stocks, bonds, or other investments; and 5) whether the respondent was in debt (28). In the analysis, net worth, house value, car value, and savings/checking were operationalized as

quartiles in order to address their non-normal distribution and to test for non-linear associations between wealth and obesity. Only a limited number of respondents had investments or debts. Thus, we operationalized debt as a binary variable indicating respondents with a negative total net worth, and we operationalized investments as a binary variable indicating whether respondents had any investments.

Controls

All statistical models included controls for several other indicators of SES, including income, education, and occupation. Income was measured using the log of yearly family income. Education was measured as educational degrees, including categories for no degree, high school degree, associate degree, bachelor' degree, and graduate degree. Occupation is measured as a categorical variable with three categories identifying respondents who were not working, respondents who had white-collar occupations (managerial and professional), and respondents who had blue- or pink-collar occupations (private household, service, operators, transportation, laborers, technical and related support, sales, administrative support, and protective services).

Several confounding factors may explain the association between wealth and obesity, including health limitations, depression, and health behaviors. Health limitations were operationalized as a binary indicator of health problems that 1) inhibit respondents' ability to work or 2) limit the amount or kind of work they can do. The analysis also controlled for depression because of its association with SES and BMI (29). The NLSY-79 collected a 7-item version of the Center for Epidemiologic Studies Depression Scale (CES-D) in the 1994 survey wave (25). Items included questions such as, e.g., whether respondents felt sad or depressed or could not get "going." Respondents answers could range from 0, rarely or none of the time (less than 1 day), to 3, most or all of the time (5 to 7 days). We calculated an average of these items for each respondent in order to create a depression score ranging from 0 to 3 (alpha = .80). SES has a strong relationship with health behaviors like smoking and physical activity, which are also correlated with BMI (30). Thus, all statistical models controlled for whether respondents were daily smokers at the time of the survey (yes=1) and whether they engaged in three or more days each week of vigorous physical exercise or sports, e.g., aerobics, running, swimming, or bicycling (yes=1).

Statistical models also controlled for several sociodemographic correlates of SES and obesity, including time-varying variables for age, urban residence, southern residence, and marital status. The NLSY-79 collects information on urbanicity and geographic region of each respondent's residence at the time of interview. A respondent is generally coded as urban if they lived in an area that the U.S. Census identified as an urbanized area or urban cluster. The NLSY-1979 also collects region of current residence (i.e., Northeast, North Central, South, or West). The analysis controlled for a binary indicator of living in the South (yes=1) because the majority of geographic variation in obesity tends to be between southern and non-southern (Northeast, North Central, or West) regions (6). Finally, marital status is operationalized as three categories: married, divorced/separated/widowed, and never married.

STATISTICAL ANALYSIS

A major strength of the NLSY-79 data is its longitudinal design, but multiple observations create time series dependencies. To address this issue, we took a Generalized Estimating Equation (GEE) approach and estimated a series of PA models for binary outcomes using Stata's *xtlogit* command (31). The most notable advantage is that PA models address non-independence in the data while also avoiding problematic assumptions that other longitudinal methods make (32, 33). Because the repeated observations of obesity have a natural order, we assumed the correlation structure is a first order autoregressive process. Because GEE is not likelihood

based, we used the Quasi-likelihood Information Criterion (QIC_u), a modification of Akaike's Information Criterion (AIC), to compare model fit (33, 34). Smaller values of the QIC_u statistic indicate a better fit.

Gender and race likely moderate the relationship between components of wealth and obesity. Research has generally found an inverse relationship between SES and obesity for women, but for men this relationship is less consistent, especially among Black men (6–9). Thus, we began the analysis with models of obesity that included the total sample, and then we considered models stratified by gender and race.

We took several precautions to ensure that missing data did not meaningfully affect results. First, we imputed missing data using chained equations (31, 35). Next, we conducted diagnostic tests to check whether imputed values were similar to the distributions of the original variables (36). Finally, we estimated models after listwise deletion. Results from models after listwise deletion suggested the same substantive conclusions we present here.

RESULTS

Table 1 presents the means of continuous variables and the proportions of each category in categorical variables. These descriptive statistics use the 2004 survey, the median survey year in the analysis, and values are based on 20 imputed datasets. Ages ranged between 39 to 47 in 2004. Total net worth, home value, car value, savings/checking, and income are presented in 2018 dollars and in units of 10,000. In the analysis, wealth and its components are converted to quartiles to address their non-normal distributions and to reveal any non-linear associations with obesity.

-- Table 1 about here --

Table 2 contains results from PA models predicting obesity with different measures of wealth. Models 1 through 7 included interactions between gender and race and controls for educational attainment, occupation, log income, and other control variables (controls are not shown; see Table A1 in the appendix for complete models). In Model 1, we found significant race, gender, and wealth differences in the odds of obesity. Black women had significantly higher odds than white men (95% CI = 1.54, 2.18), whereas White women had significantly lower odds than White men (95% CI = 0.77, 0.97). Those in the third and fourth quartiles of net worth had significantly lower odds of obesity than the first quartile (95% CI = 0.77, 0.94 for Q3 and 95% CI = 0.61, 0.77 for Q4).

For Models 2 through 7 in Table 2, we disaggregated net worth into its components: housing wealth, car value, savings/checking, investments, and debt. We found that Model 7, which contains all five components of net worth, was the best fitting (QIC_u = 7,068). In this model, we found that being in the fourth quartile of housing wealth and savings was significantly related to a reduction in the odds of obesity, whereas debt was significantly associated with an increase in the odds of obesity. We also found a non-linear association between savings and obesity in which the second quartile is related to a higher odds ratio of obesity (95% CI = 1.10, 1.27) than the first, third, and fourth quartiles.

-- Table 2 about here --

Figure 1 displays predicted probabilities of obesity based on the results of PA models in Table 2. Figure 1 provides a visualization of the differences in magnitude of the wealth-obesity associations. The highest quartiles of total net worth have the smallest predicted probability of obesity. Although debt is related to a significantly larger probability of obesity, the difference in probabilities between those with and without debt is relatively small when compared to the differences in the probability of obesity for quartiles of net worth, home value, and savings.

-- Figure 1 about here --

Table 3 contains results from models stratified by gender and race. Even after controlling for education, occupation, income, and sociodemographic variables (see Table A2 in the appendix for complete models), we found that Black and White women and White men in the fourth quartiles of total net worth had significantly lower odds of obesity than those in the first quartile of net worth (95% CI = 0.42, 0.72 for Black women; 95% CI = 0.44, 0.65 for White women; and 95% CI = 0.60, 0.96 for White men). A few notable race and gender differences emerged when we examined components of wealth in Models 2, 4, 6, and 8. First, debt had a positive association with obesity for Black women in Model 2 (95% CI = 1.10, 1.50). Home value was significantly related to lower obesity for White women in Model 4 (95% CI = 0.59, 0.88) and White men in Model 8 (95% CI = 0.65, 0.92).

Another notable result is that some forms of wealth had a positive association with obesity—but only for women and Black men. For example, both Black and White women in the second quartile of savings had a significantly higher odds ratio of obesity than Black and White women in the first quartile of savings (95% CI = 1.02, 1.33 for Black women and 95% CI = 1.12, 1.52 for White women). For Black men, the third quartile of car value was associated with a higher odds ratio of obesity (95% CI = 1.07, 1.63). Related, the QIC_u statistic suggests that models of obesity using the components of wealth are generally a better fit for all social group—with one notable exception; for Black men, the QIC_u suggests that the components model is a poorer fit than the net worth model. Taken together, significance tests and the QIC_u statistic suggest that neither net worth nor its components have a meaningful relationship with obesity among Black men.

-- Table 3 about here --

Figure 2 highlights the heterogeneity in the magnitude of the wealth-obesity associations across components and social groups. Net worth and obesity had a larger association among Black and White women. Housing wealth appears to be the key component driving the overall net worth-obesity relationship for White women and men, whereas savings and debt appear to be more important for Black women. For both Black and White men, the probability of obesity is relatively similar to the overall proportion of obesity for each group and relatively stable across quartiles of wealth and its components.

-- Figure 2 about here --

DISCUSSION

To extend the growing body of health disparities research on wealth, we examined the relationship between obesity and five major components of wealth, including housing wealth, savings, investments, automotive vehicle wealth, and debt. Results from the analysis provided evidence that multiple components of wealth are significantly associated with obesity, but the nature and magnitude of these associations varied considerably by one's gender, race, and source of wealth. We review these results and their implications in more detail below.

With the exception of Black men, net worth had a significant and inverse relationship with obesity. In models that were not stratified by gender and race, the two highest quartiles of net worth had the lowest odds of obesity. In models that were stratified by gender and race, the association between net worth and obesity was largest for women but had notable racial differences. For Black women, those in the highest quartile of net worth had a significantly lower probability of obesity than women in every other quartile, whereas for White women, both the third and fourth quartiles had relatively low predicted probabilities of obesity. We also found a significant association between net worth and obesity for White men, but the association was relatively small when compared to the results for Black and White women. Thus, for Black and White women and White men, our

results suggest that wealth provides additional information on the relationship between SES and obesity beyond what education, occupation, and income provide (1).

A more complex picture of the wealth-obesity relationship emerged when we disaggregated net worth into its components. Housing wealth had a particularly large association with obesity for White women and men. While this result supports research on obesogenic environments and property value (12, 37), we found little evidence of a similar association between housing wealth and obesity among Black women and men. This finding could be the result of discriminatory practices at multiple stages of purchasing a home that constrain Black families from moving into more desirable—and less obesogenic—neighborhoods (10, 12). Thus, future research should extend this study by considering how residential quality and racial segregation moderate the relationship between housing wealth and obesity.

Being in debt was positively associated with a higher probability of obesity among Black women, and this relationship remained significant even after controlling for housing wealth (an important control given that mortgages tend to make up a significant portion of debt). This finding, along with the null finding of housing wealth, provides evidence that the wealth-obesity relationship among Black women may be due more to stress than the obesogenic qualities of low-income neighborhoods. Household debt is common among minority communities, who are often the victims of predatory lending (38), and debt among minorities is associated with higher levels of stress and depression (19). Although this association is relatively small in magnitude, it is still pertinent given the increasing concerns about the high levels of debt among recent generations of young adults (5, 22).

The results for Black men support prior studies that have found little evidence of an association between SES and obesity for this population (6–9). One potential explanation is the diminishing returns theory of SES among Black Americans (39, 40). Unlike White women and men, socioeconomic attainment can actually increase exposure to discrimination among Black men and women as they enter predominately White workplaces, and these experiences generally have a positive association with obesity (41, 42). Taken together, these studies suggest that racial discrimination among high-SES Black men may negate any obesity-related advantages that wealth might otherwise provide.

Finally, the analysis revealed several non-linear relationships between components of wealth and obesity. For example, women in the second quartile of savings had the highest probability of obesity when compared to women in either lower or higher quartiles of savings. Related, prior research examining the middle class has found higher levels of anxiety among the lower-middle class, whose middle-class status may be tenuous, only one financial emergency away from poverty or even homelessness (43). The stress of living in this precarious economic position may in turn cause weight gain, providing further evidence that wealth can increase the probability of obesity under certain conditions (44).

This study is the first to examine how wealth and its components are related to obesity among adults entering midlife, but it still has notable limitations. First, our findings are largely descriptive. We were primarily concerned with establishing a baseline association between components of wealth and obesity across key social groups. Future research should examine the underlying mechanisms that link wealth to obesity with a focus on directly testing how stress and health behaviors mediate the wealth-obesity relationship we find here. Second, we do not consider wealth shocks. A number of recent studies have found wealth shocks can have a direct impact on physiological functioning related to obesity (2, 3). Although beyond the scope of this study, future research should examine how substantial drops in

wealth affect health behaviors and, in turn, BMI. Lastly, we use self-reported height and weight to calculate BMI, and while it is a good proxy for measured height and weight, there are validity and reliability concerns related to race, gender, and education. But misreporting by race/gender should not be an issue in our analyses given that they are stratified by race and gender, and we were concerned about patterns within groups rather than examining disparities between groups. Also, controls for education likely help to account for reporting differences. Nevertheless, future work should confirm our results using measured height and weight (45).

CONCLUSION

Past research examining SES and health in midlife has highlighted the need to understand how wealth impacts health. We found that housing wealth, savings, and debt were each important correlates of adult obesity, but although the association between wealth and obesity was robust, it also varied substantially by gender and race. Thus, studies of adult obesity that do not incorporate wealth into statistical models may overlook important links between SES and obesity and the structural inequalities that create them. Our results also have implications for social policy. First, social programs aimed at health and obesity disparities should always consider multiple sources of wealth and their implications for different social groups when developing and implementing obesity-related interventions. Second, policies that reduce the obesogenic qualities of disadvantaged neighborhoods could simultaneously reduce obesity-related health issues and stimulate property values within a community. Finally, our results suggest that policies aimed at reducing debt and financial insecurity may also help reduce obesity rates among middle-aged Black women.

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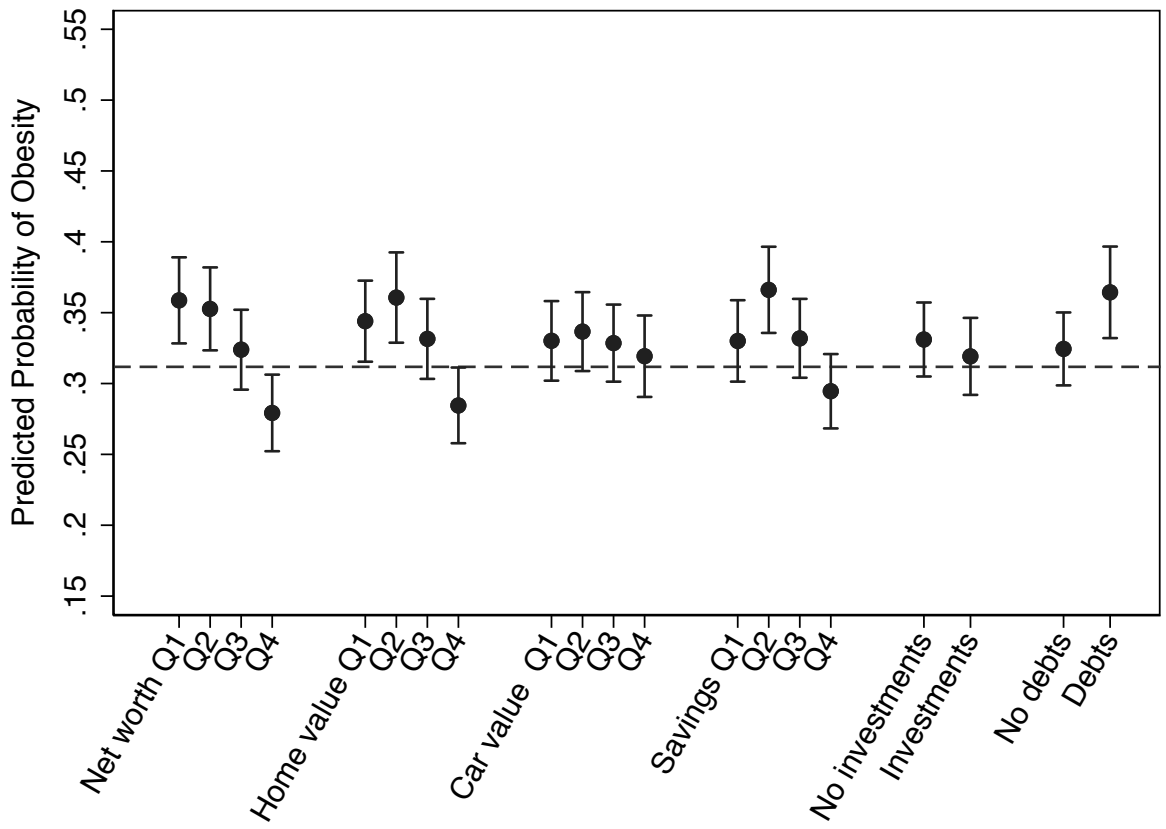
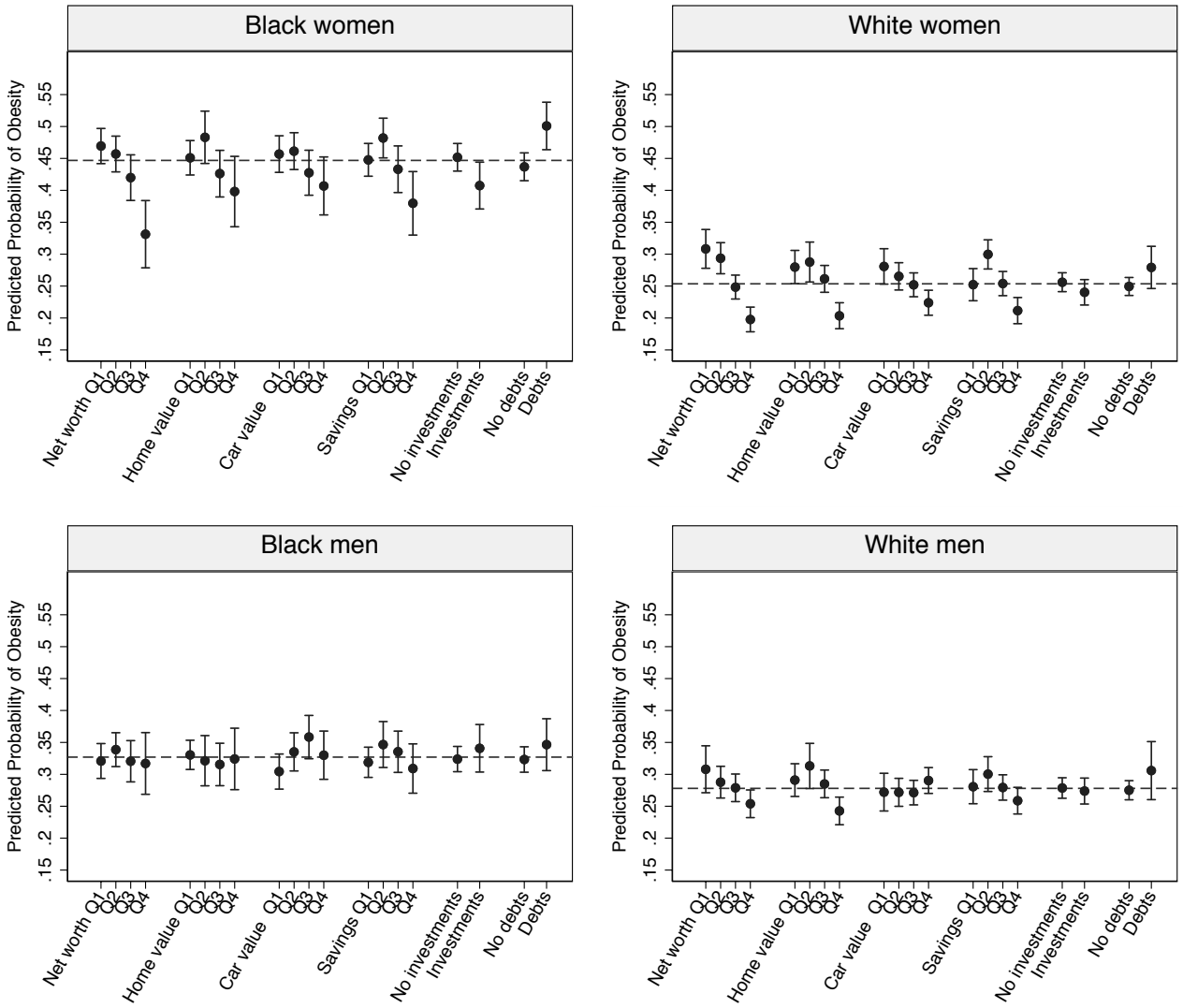
Figure 1. Predicted probability of obesity at age 45 with 95% confidence intervals, total sample



Notes: The dashed line denotes the overall proportion of obesity for the total sample. Models include controls for gender, race, age, survey year, education, occupation, income, urban residence, living in the South, and marital status. Predicted probabilities were estimated using the coefficients displayed in Models 1 through 6 in Table 2. Age was held at 45, and all other control variables were held at their observed values.

Figure 2. Predicted proportion of obesity at age 45 with 95% confidence intervals, stratified by gender and race



Notes: The dashed line denotes the overall proportion of obesity for the total sample. Models include controls for age, survey year, education, occupation, income, urban residence, living in the South, and marital status. Predicted probabilities were estimated using the coefficients displayed in Models 2, 4, 6, and 8 in Table 3. Age was held at 45, and all other control variables were held at their observed values.

Table 1. Mean or proportion of analysis variables stratified by gender and race (N = 6,979, Survey Year = 2004)

	Total sample	Black women	White women	Black men	White men
Sample size (N)	6,979	1,330	2,184	1,312	2,153
Outcome					
Obesity (BMI ≥ 30)	0.31	0.47	0.25	0.33	0.27
Wealth					
Total net worth	19.38	6.33	25.85	8.48	27.52
Housing wealth	15.01	6.43	19.45	7.41	20.43
Car value	1.76	1.02	2.22	1.17	2.11
Savings/checking	1.37	0.39	1.96	0.65	1.80
Any investments?	0.37	0.29	0.43	0.25	0.44
In debt?	0.13	0.17	0.11	0.15	0.10
Control variables					
Family income	8.49	7.72	8.06	8.08	9.66
Educational degrees					
No degree	0.17	0.19	0.13	0.23	0.15
High school	0.55	0.59	0.52	0.62	0.53
Associates	0.08	0.09	0.09	0.05	0.06
College	0.15	0.11	0.20	0.08	0.19
Graduate	0.05	0.02	0.06	0.02	0.07
Occupation					
Blue or pink-collar	0.50	0.49	0.41	0.60	0.54
White collar	0.28	0.22	0.34	0.15	0.34
Not working	0.21	0.28	0.25	0.25	0.12
Daily smoker?	0.29	0.27	0.27	0.36	0.28
Exercise 3+ days per week	0.53	0.39	0.49	0.55	0.65
Health limitations	0.15	0.21	0.15	0.16	0.09
Depression (CES-D)	0.53	0.69	0.59	0.49	0.39
Urban residence	0.72	0.84	0.64	0.84	0.65
Southern residence	0.44	0.62	0.34	0.60	0.32
Marital status					
Married	0.58	0.37	0.69	0.42	0.69
Divorced, separated, or widowed	0.24	0.33	0.23	0.24	0.18
Never married	0.18	0.30	0.07	0.34	0.12

Notes: Values are based on 20 imputed datasets. These descriptive statistics are from the 2004 survey, which is the median survey year for the analysis sample. Ages ranged between 39 to 47 in 2004. Total net worth, home value, car value, savings/checking, and income are in 2018 dollars and presented in units of 10,000. In the analysis, wealth and its components are measured as quartiles.

Table 2. Exponentiated coefficients (odds ratios) with 95% confidence intervals from population-averaged logistic regression models of obesity, total sample (N = 6,979; Observations = 34,895)

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**
Gender x race (ref. White men)							
White women	0.87*	0.86*	0.86**	0.85**	0.86**	0.86**	0.86**
	(0.77, 0.97)	(0.77, 0.97)	(0.76, 0.96)	(0.76, 0.95)	(0.76, 0.96)	(0.76, 0.96)	(0.76, 0.96)
Black men	1.13	1.15*	1.19*	1.18*	1.19*	1.19*	1.16*
	(0.98, 1.29)	(1.01, 1.32)	(1.04, 1.36)	(1.03, 1.35)	(1.04, 1.36)	(1.04, 1.36)	(1.01, 1.33)
Black women	1.84***	1.84***	1.85***	1.85***	1.86***	1.85***	1.83***
	(1.54, 2.18)	(1.55, 2.19)	(1.56, 2.21)	(1.56, 2.20)	(1.56, 2.21)	(1.56, 2.20)	(1.54, 2.18)
Total net worth (ref. Q1)							
2nd quartile	0.97						
	(0.90, 1.06)						
3rd quartile	0.85**						
	(0.77, 0.94)						
4th quartile	0.68***						
	(0.61, 0.77)						
Housing wealth (ref. Q1)							
2nd quartile		1.08					1.08
		(0.99, 1.18)					(0.99, 1.18)
3rd quartile		0.94					0.97
		(0.87, 1.03)					(0.89, 1.05)
4th quartile		0.75***					0.79***
		(0.68, 0.83)					(0.72, 0.88)
Car value (ref. Q1)							
2nd quartile			1.03				1.03
			(0.95, 1.12)				(0.94, 1.12)
3rd quartile			0.99				1.02
			(0.91, 1.09)				(0.93, 1.12)
4th quartile			0.95				1.02
			(0.86, 1.05)				(0.92, 1.12)
Savings and checking (ref. Q1)							
2nd quartile				1.18***			1.18***
				(1.10, 1.27)			(1.09, 1.27)
3rd quartile				1.01			1.04
				(0.92, 1.10)			(0.96, 1.13)
4th quartile				0.84**			0.89*
				(0.76, 0.93)			(0.81, 0.99)
Any investments?					0.94		0.98
					(0.89, 1.00)		(0.92, 1.05)
In debt?						1.20***	1.17***
						(1.10, 1.32)	(1.07, 1.28)
QICu	7087	7090	7129	7094	7127	7114	7068

Notes: * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$ (two-tailed tests). All models control for age, survey year, education, occupation, log income, health limitations, depression, smoking, exercise, urban residence, living in the South, and marital status.

Table 3. Exponentiated coefficients (odds ratios) with 95% confidence intervals from population-averaged logistic regression models of obesity, stratified by gender and race (N = 6,979; Observations = 34,895)

	Black women		**White women**		**Black men**		**White men**	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Total net worth (ref. Q1)								
2nd quartile	0.95		0.93		1.09		0.90	
	(0.83, 1.08)		(0.79, 1.10)		(0.94, 1.26)		(0.75, 1.09)	
3rd quartile	0.81*		0.73***		1.00		0.86	
	(0.68, 0.97)		(0.61, 0.87)		(0.82, 1.22)		(0.70, 1.06)	
4th quartile	0.55***		0.54***		0.98		0.76*	
	(0.42, 0.72)		(0.44, 0.65)		(0.75, 1.29)		(0.60, 0.96)	
Home value (ref. Q1)								
2nd quartile		1.19		1.06		0.92		1.12
		(0.98, 1.45)		(0.87, 1.29)		(0.76, 1.12)		(0.92, 1.35)
3rd quartile		0.96		0.96		0.90		0.97
		(0.80, 1.15)		(0.81, 1.14)		(0.75, 1.08)		(0.84, 1.13)
4th quartile		0.90		0.72**		0.96		0.77**
		(0.69, 1.19)		(0.59, 0.88)		(0.74, 1.23)		(0.65, 0.92)
Car value (ref. Q1)								
2nd quartile		1.02		0.91		1.16		0.99
		(0.89, 1.18)		(0.77, 1.08)		(0.98, 1.39)		(0.84, 1.18)
3rd quartile		0.90		0.89		1.32*		1.03
		(0.75, 1.09)		(0.76, 1.05)		(1.07, 1.63)		(0.86, 1.22)
4th quartile		0.86		0.80*		1.18		1.17
		(0.68, 1.09)		(0.67, 0.95)		(0.92, 1.51)		(0.98, 1.40)
Savings and checking (ref. Q1)								
2nd quartile		1.17*		1.30***		1.11		1.10
		(1.02, 1.33)		(1.12, 1.52)		(0.93, 1.31)		(0.94, 1.29)
3rd quartile		1.00		1.09		1.04		1.01
		(0.83, 1.20)		(0.92, 1.28)		(0.87, 1.24)		(0.86, 1.18)
4th quartile		0.83		0.88		0.90		0.92
		(0.65, 1.07)		(0.72, 1.08)		(0.72, 1.13)		(0.76, 1.10)
Any investments?		0.86		0.97		1.09		1.01
		(0.74, 1.01)		(0.87, 1.09)		(0.92, 1.29)		(0.91, 1.12)
In debt?		1.28**		1.09		1.12		1.13
		(1.10, 1.50)		(0.92, 1.30)		(0.93, 1.35)		(0.90, 1.42)
QICu	7766	7584	7355	7269	7563	7584	7337	7288

Notes: * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$ (two-tailed tests). All models control for age, survey year, education, occupation, log income, health limitations, depression, smoking, exercise, urban residence, living in the South, and marital status

Appendix

Table S1. Exponentiated coefficients (odds ratios) from population-averaged logit models of obesity, total sample (N = 6,979; Observations = 34,895)

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**
Gender x race (ref. White men)							
White women	0.87*	0.86*	0.86**	0.85**	0.86**	0.86**	0.86**
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Black men	1.13	1.15*	1.19*	1.18*	1.19*	1.19*	1.16*
	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
Black women	1.84***	1.84***	1.85***	1.85***	1.86***	1.85***	1.83***
	(0.16)	(0.16)	(0.16)	(0.16)	(0.16)	(0.16)	(0.16)
Total net worth (ref. Q1)							
2nd quartile	0.97						
	(0.04)						
3rd quartile	0.85**						
	(0.04)						
4th quartile	0.68***						
	(0.04)						
Home value (ref. Q1)							
2nd quartile		1.08					1.08
		(0.05)					(0.05)
3rd quartile		0.94					0.97
		(0.04)					(0.04)
4th quartile		0.75***					0.79***
		(0.04)					(0.04)
Car value (ref. Q1)							
2nd quartile			1.03				1.03
			(0.05)				(0.04)
3rd quartile			0.99				1.02
			(0.05)				(0.05)
4th quartile			0.95				1.02
			(0.05)				(0.05)
Savings and checking (ref. Q1)							
2nd quartile				1.18***			1.18***
				(0.05)			(0.04)
3rd quartile				1.01			1.04
				(0.04)			(0.05)
4th quartile				0.84**			0.89*
				(0.04)			(0.05)
Any investments?					0.94		0.98
					(0.03)		(0.03)
In debt?						1.20***	1.17***
						(0.06)	(0.05)
Ln(Family Income)	1.02***	1.02***	1.02**	1.02**	1.02**	1.01**	1.02**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Ed. Degrees							
High school	0.96	0.95	0.93	0.94	0.93	0.93	0.94
	(0.06)	(0.06)	(0.06)	(0.06)	(0.05)	(0.05)	(0.06)
Associates	0.88	0.87	0.85	0.86	0.85	0.84	0.86
	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
College	0.73***	0.72***	0.67***	0.70***	0.67***	0.67***	0.74***
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Advanced degree	0.46***	0.45***	0.41***	0.44***	0.41***	0.41***	0.47***
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Occupation							
White collar	1.02	1.02	1.00	1.01	1.00	1.00	1.02
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)

Not working	1.00	1.01	1.00	1.01	1.00	1.00	1.02
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Residence (ref. rural)							
Urban	0.91*	0.92*	0.92*	0.92*	0.92*	0.92*	0.92*
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Southern residence (ref. no)							
Yes	1.04	1.03	1.05	1.05	1.05	1.05	1.03
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Marital status (ref. married)							
Divorced, separated, widowed	0.80***	0.81***	0.84***	0.83***	0.85***	0.84***	0.81***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Never married	0.96	0.97	1.01	1.00	1.02	1.01	0.97
	(0.06)	(0.06)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Depression (CES-D)	1.16***	1.17***	1.19***	1.18***	1.19***	1.18***	1.16***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Daily smoker?	0.65***	0.66***	0.66***	0.66***	0.67***	0.66***	0.65***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Exercise 3+ days per week	0.83***	0.82***	0.82***	0.82***	0.82***	0.82***	0.83***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Health limitations	1.27***	1.27***	1.28***	1.27***	1.28***	1.27***	1.25***
	(0.06)	(0.06)	(0.07)	(0.06)	(0.06)	(0.06)	(0.06)

Notes: * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$ (two-tailed tests). Standard errors are in parentheses.

Table S2. Exponentiated coefficients (odds ratios) from population-averaged logit models of obesity, total sample (N = 6,979; Observations = 34,895)

	Black women		**White women**		**Black men**		**White men**	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Total net worth (ref. Q1)								
2nd quartile	0.95		0.93		1.09		0.90	
	(0.06)		(0.08)		(0.08)		(0.09)	
3rd quartile	0.81*		0.73***		1.00		0.86	
	(0.07)		(0.06)		(0.10)		(0.09)	
4th quartile	0.55***		0.54***		0.98		0.76*	
	(0.08)		(0.05)		(0.13)		(0.09)	
Home value (ref. Q1)								
2nd quartile		1.19		1.06		0.92		1.12
		(0.12)		(0.10)		(0.09)		(0.11)
3rd quartile		0.96		0.96		0.90		0.97
		(0.09)		(0.08)		(0.08)		(0.07)
4th quartile		0.90		0.72**		0.96		0.77**
		(0.13)		(0.07)		(0.12)		(0.07)
Car value (ref. Q1)								
2nd quartile		1.02		0.91		1.16		0.99
		(0.07)		(0.08)		(0.10)		(0.09)
3rd quartile		0.90		0.89		1.32*		1.03
		(0.09)		(0.07)		(0.14)		(0.09)
4th quartile		0.86		0.80*		1.18		1.17
		(0.10)		(0.07)		(0.15)		(0.10)
Savings and checking (ref. Q1)								
2nd quartile		1.17*		1.30***		1.11		1.10
		(0.08)		(0.10)		(0.10)		(0.09)
3rd quartile		1.00		1.09		1.04		1.01
		(0.09)		(0.09)		(0.09)		(0.08)
4th quartile		0.83		0.88		0.90		0.92
		(0.11)		(0.09)		(0.10)		(0.09)
Any investments?		0.86		0.97		1.09		1.01
		(0.07)		(0.06)		(0.09)		(0.05)
In debt?		1.28**		1.09		1.12		1.13
		(0.10)		(0.10)		(0.11)		(0.13)
Ln(Family Income)	1.02*	1.02*	1.01	1.01	1.02	1.02	1.01	1.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Ed. Degrees								
High school	0.71**	0.69**	0.86	0.85	1.10	1.08	1.13	1.14
	(0.08)	(0.08)	(0.10)	(0.10)	(0.14)	(0.14)	(0.13)	(0.13)
Associates	0.81	0.79	0.81	0.79	1.00	0.97	0.84	0.85
	(0.15)	(0.15)	(0.14)	(0.13)	(0.25)	(0.24)	(0.17)	(0.17)
College	0.71	0.71	0.55***	0.56***	1.21	1.17	0.73*	0.77
	(0.13)	(0.13)	(0.09)	(0.09)	(0.26)	(0.25)	(0.11)	(0.12)
Advanced degree	0.40*	0.41*	0.48**	0.50**	0.76	0.72	0.37***	0.39***
	(0.15)	(0.15)	(0.11)	(0.11)	(0.31)	(0.30)	(0.09)	(0.09)
Occupation								
White collar	0.95	0.95	1.04	1.04	1.01	1.00	1.06	1.06
	(0.08)	(0.08)	(0.07)	(0.07)	(0.12)	(0.12)	(0.08)	(0.08)
Not working	1.04	1.04	1.03	1.05	1.04	1.04	0.97	0.99
	(0.08)	(0.08)	(0.07)	(0.07)	(0.10)	(0.10)	(0.08)	(0.09)
Residence (ref. rural)								
Urban	0.80*	0.81*	0.90	0.91	0.96	0.96	0.95	0.97
	(0.08)	(0.08)	(0.06)	(0.06)	(0.10)	(0.10)	(0.06)	(0.06)
Southern residence (ref. no)								
Yes	1.15	1.14	1.00	1.02	1.02	1.02	0.99	0.97

	(0.11)	(0.11)	(0.09)	(0.10)	(0.11)	(0.11)	(0.09)	(0.09)
Marital status (ref. married)								
Divorced, separated, widowed	0.88	0.87	0.76**	0.75**	0.82	0.83	0.74**	0.75**
	(0.08)	(0.08)	(0.07)	(0.07)	(0.08)	(0.09)	(0.07)	(0.07)
Never married	1.12	1.12	1.48*	1.43*	0.78*	0.80	0.90	0.93
	(0.15)	(0.15)	(0.24)	(0.22)	(0.09)	(0.09)	(0.12)	(0.13)
Depression (CES-D)	1.22*	1.21*	1.27***	1.28***	0.88	0.88	1.13	1.13
	(0.10)	(0.10)	(0.08)	(0.08)	(0.08)	(0.08)	(0.09)	(0.10)
Daily smoker?	0.67***	0.67***	0.62***	0.62***	0.66***	0.66***	0.65***	0.65***
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.05)	(0.05)
Exercise 3+ days per week	0.89	0.89	0.74***	0.74***	0.84**	0.84**	0.84**	0.84***
	(0.06)	(0.06)	(0.04)	(0.04)	(0.05)	(0.05)	(0.04)	(0.04)
Health limitations	1.26*	1.26*	1.44***	1.44***	1.00	0.98	1.30*	1.29*
	(0.12)	(0.12)	(0.13)	(0.13)	(0.11)	(0.10)	(0.14)	(0.14)

Notes: * $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$ (two-tailed tests). Standard errors are in parentheses.