

# Social and Economic Consequences of Obesity during the Transition to Adulthood

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The prevalence of adolescent obesity has increased dramatically in the past four decades. Since the late 1960s, the prevalence of obesity among adolescents (ages 12-19) has quadrupled to about 18% (Story, Sallis and Orleans 2010). Obesity among youth has become a serious public health concern because it is related to many adverse health conditions in adolescence and adulthood (e.g., heart disease, high blood pressure, cancer, diabetes) (Reilly et al. 2003). Obesity in early life can also be an important source of social stratification in adulthood. The severe health consequences of obesity can produce potentially disabling conditions that can reduce education, the ability to work, and the development of social relationships. Indeed, there is a large body of evidence linking obesity to lower wages, lower education, and a lower likelihood of marriage (e.g., Averett and Korenman 1999; Baum and Ford 2004; Cawley 2004; Crosnoe 2007; Gortmaker et al. 1993; Han, Norton and Stearns 2009; Morris 2006; Pagan and Davilla 1997; Tunceli, Li and Williams 2006). In addition, there is a social response to obesity that may be unique compared to other health conditions. Obese individuals endure social exclusion and discrimination, experience low self-esteem and social stigma and suffer from depression (Carr and Friedman 2005, 2006; Eisenberg, Neumark-Sztainer, Story 2003; Link and Phelan 2001; Puhl 2009). These factors may influence the ability of youth to achieve in school, obtain employment and create romantic partnerships, which can affect their ability to make successful transitions into adulthood.

## **METHOD**

This project examines the social and economic consequences of obesity trajectories in early life—from adolescence through the transition to adulthood. We use data from the National Longitudinal Study of Adolescent Health (Add Health) that followed a national cohort of U.S. adolescents in grades 7-12 in the U.S. in 1995 (ages 12-19) with three follow-up waves of interviews in 1996, 2002, and most recently in 2008 when the cohort was aged 24-32.

With data on measured height and weight, we track obesity trajectories from adolescence through the transition to adulthood in 2002 and classify young people according to the following trajectories of obesity experience: i) persistent obesity—those who were obese in adolescence (Wave 2) and through the transition to adulthood (Wave 3); ii) become obese (or incidence obesity)—those who were not obese in adolescence (Wave 2) and become obese in early adulthood (Wave 3); and iii) not obese—those who were never obese, or only obese in adolescence (Wave 2) and then not obese by early adulthood (Wave 3) (Refer to Figure 1). We then examine the social and economic consequences in adulthood (Wave 4) associated with different trajectories of obesity, controlling for various important family background and demographic measures in childhood/adolescence (Wave 1).

We examine the relationship between obesity trajectories in early life and multiple measures of social stratification in adulthood. The outcomes we plan to examine include impacts on education (attending/finishing college), household income, welfare receipt, material deprivation, subjective social status and debt.

Our theoretical interest is in the mechanisms that may explain how obesity trajectories during the transition to adulthood impact social and economic status in adulthood. We will explore the roles that

depression and self esteem play in social stratification pathways, and model a proxy for a social stigma mechanism using measures of attractiveness. Add Health is unique in that at every wave, interviewers were asked to report on a series of question about the attractiveness of the respondent. In addition, we control for interviewer characteristics such as age, race and sex. We argue that these independent measures of respondent attractiveness serve as objective indicators of a social response to obesity. We also explore the roles of discrimination, health insurance status and missed work days due to poor health as potential mediators of obesity impacts. In addition to using an extensive array of control variables that are associated with both obesity trajectories and social and economic outcomes, we employ interviewer- and state-fixed effects models to control for unobserved selection factors associated with obesity classification and propensities at the individual and state levels.

## **HYPOTHESES**

We anticipate that greater exposure to obesity during the transition to adulthood , especially persistent obesity during this life stage, will place individuals at the bottom of the social stratification system on these outcomes, relative to no or very little exposure to obesity.

We suspect that these effects will be stronger for females, particularly white females, given the results for previous research and cultural variations in norms for beauty among females (Averett and Korenman 1999).

We anticipate that ratings of interviewer attractiveness will be lower for obese individuals, and will serve to mediate the relationship between obesity and social status in adulthood.

## **PRELIMINARY RESULTS**

Table 1 presents the weighted means and standard errors for the variables used in this analysis. The following describes the construction of variables for which their definition is not obvious. Interviewer attractiveness scale is constructed from summing responses (using a 5 point Likert Scale) to a series of three questions asked to the interviewer about the respondent i) physical attractiveness; ii) personality attractiveness; and iii) grooming. Material deprivation is a count of five financial troubles occurring within the past twelve months (Range: 0-5) including: i) being without phone service because didn't have enough money; ii) didn't pay full amount of rent or mortgage because didn't have enough money; iii) worried whether food would run out before could get money to buy more; iv) didn't pay full amount of gas, electricity, or oil bill because didn't have enough money; and v) electricity, or oil service shut off because payments not made. The Wave 4 outcome, Subjective Social Status (The MacArthur Scale of Subjective Social Status) measures a common sense of social status across SES indicators. Respondents are presented with a picture of a ladder with ten steps, where 1 is the lowest rung and 10 is the highest rung. Respondents are asked to "Pick the number for the step that shows where you think you stand at this time in your life, relative to other people in the United States." Responses range from 1 to 10. The Wave 4 outcome, Debt, is based on the question, "Suppose you and others in your household were to sell all of your major possessions (including your home), turn all of your investments and other assets into cash, and pay off all of your debts. Would you have something left over, break even, or be in debt?" Debt is a dichotomous indicator where 0 includes the responses "have something left over" or "break even," and 1 is the response "be in debt."

In Table 2 we explore the relationship between the obesity trajectories and social status outcomes controlling for race/ethnicity, age, family SES and AHPVT at Wave 1. For females, both becoming and staying obese are related to all social status outcomes, though the impact of staying obese and becoming obese differs depending on the social status outcome examined. For males, becoming and staying obese

are only related to college degree attainment. These results support previous research indicating that females bear the largest economic penalties for being obese.

In order for our theoretical mechanisms to potentially mediate the impacts of obesity trajectories, they must be empirically related. In Table 3 we explore the bivariate relationships between each obesity trajectory and the Wave 3 and Wave 4 mediating mechanisms used in the analysis. It should be noted that both becoming obese and staying obese were both included in the regression analysis as predictors (with stay or reduce to non-obese as the reference category). For females, becoming obese and staying obese is associated with lower levels of attractiveness (as reported by the interviewers) at Wave 3. These relationships remain significant even when accounting for interviewer characteristics of age, race/ethnicity, and sex. In addition, becoming obese is also associated with lower levels of self esteem at Wave 3, while becoming and staying obese are related to lower levels of self-reported health at Wave 4 for females. Becoming obese is also associated with higher levels of self reported discrimination at Wave 4 for females, and this relationship remains significant after controlling for race/ethnicity. Among males, becoming and staying obese is also related to lower levels of attractiveness. Interestingly, staying obese is also related to lower levels of depression for males at Wave 3. In addition, becoming and staying obese is also related to having fewer friends and lower self-reported health status at Wave 4 for males. These results indicate that both obesity incidence and persistence are related to poor physical and mental health and higher levels of social stigma (as reported by interviewer attractiveness) for both males and females.

### **Future Analysis and Contribution**

Our next analytic step is to conduct the multivariate analysis incorporating the models shown in tables 2 and 3 to observe whether and how our theoretical mechanisms mediate the impacts of obesity trajectories for females and males during the transition to adulthood. We will then conduct sensitivity analyses using interviewer- and state-fixed effects to control for unobserved variation in interviewer classifications of attractiveness and state influences on obesity patterns. This paper contributes new data to the literature examining the relationship between obesity and social status by focusing on obesity during the critical developmental stage of adolescence and the transition to adulthood and status attainment in young adulthood (previous research has tended to focus on these relationships in the older adult ages). We also use recent national data from a longitudinal cohort, examine multiple measures of status attainment, explore theoretical mediating mechanisms of obesity impacts, and operationalize stigma using interviewer attractiveness as an important mediator.

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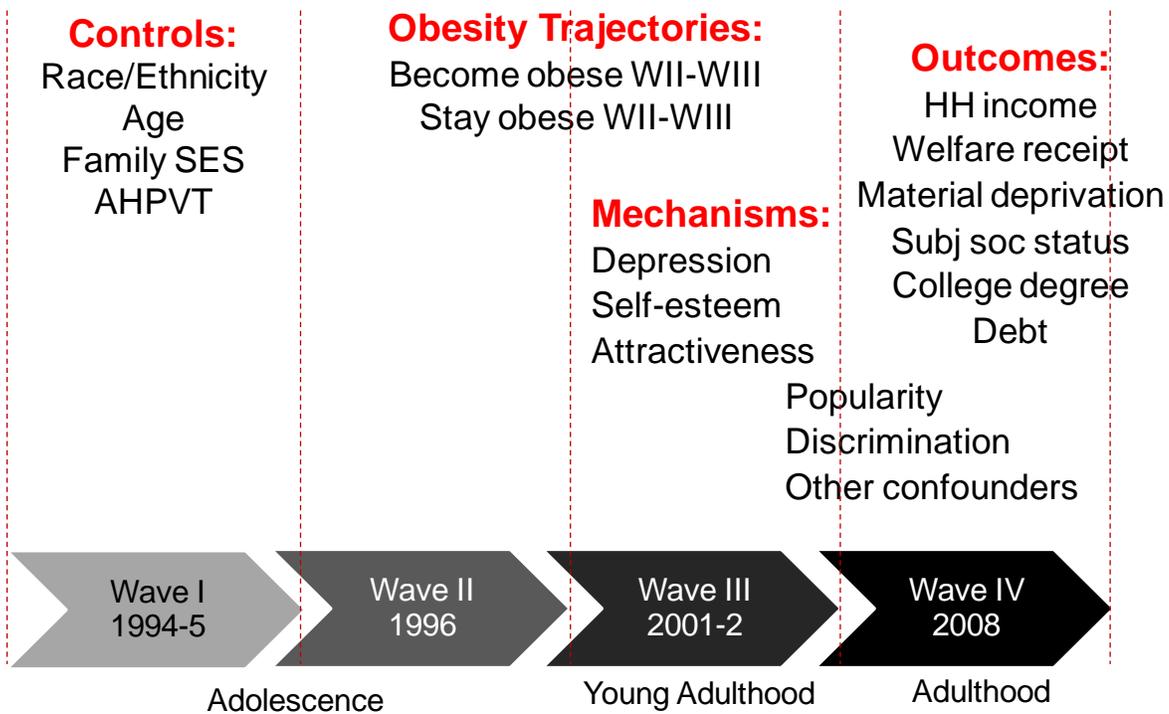
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**Figure 1: Study Design**



**Table 1: Weighted Means and Standard Errors by Sex**

	Female		Male	
	Mean	SE	Mean	SE
<b>Obesity Trajectory</b>				
Become Obese	0.129	0.009	0.117	0.008
Stay Obese	0.084	0.008	0.103	0.009
Stay or Reduce Nonobese	0.787	0.013	0.780	0.012
<b>Wave 4 Social Status Outcomes</b>				
College Degree	0.428	0.022	0.336	0.022
Household Income	61891.140	1431.976	64585.330	1339.837
Log of Income	10.758	0.032	10.839	0.028
Debt	0.240	0.012	0.186	0.011
Material Deprivation	0.485	0.027	0.409	0.027
Subjective Social Status	5.092	0.064	5.058	0.060
Welfare	0.237	0.018	0.165	0.012
<b>Wave 1 Controls</b>				
Black	0.164	0.023	0.141	0.022
White	0.691	0.029	0.687	0.030
Asian	0.035	0.008	0.039	0.009
Hispanic	0.099	0.015	0.118	0.017
Other	0.011	0.003	0.016	0.003
Age	14.799	0.120	15.025	0.122
Family SES Scale	1.264	0.051	1.236	0.047
AHPVT (cognitive ability)	101.724	0.741	102.851	0.709
<b>Wave 3 Mechanisms</b>				
Depression score (CESD)	1.405	0.044	0.994	0.042
Self Esteem	20.851	0.072	21.179	0.069
Interviewer Attractive Scale	10.998	0.071	10.418	0.068
<b>Wave 3 Controls</b>				
Interviewer Black	0.179	0.020	0.188	0.019
Interviewer Hispanic	0.760	0.023	0.765	0.021
Interviewer White	0.043	0.010	0.036	0.009
Interviewer Asian	0.003	0.002	0.000	0.000
Interviewer Indian	0.011	0.004	0.004	0.002
Interviewer Other	0.004	0.002	0.006	0.003
Interviewer Female	0.831	0.020	0.777	0.023
Interviewer Age	50.077	0.674	50.275	0.594
<b>Wave 4 Mechanisms</b>				
Discrimination	0.955	0.020	0.983	0.024
Friends	4.723	0.091	5.132	0.108
General Health Status	3.661	0.028	3.715	0.026
Missed Work Days	0.252	0.015	0.173	0.014
Currently Married	0.386	0.015	0.337	0.017
<b>N</b>	2,779		2,588	

**Table 2: Relationship Between Obesity Trajectories and Social Status Outcomes at Wave 4**

	Female						Male					
	Become Obese			Stay Obese			Become Obese			Stay Obese		
	Mean	SE	Sig	Mean	SE	Sig	Mean	SE	Sig	Mean	SE	Sig
<b>Wave 4 Social Status</b>												
College Degree	0.576	0.100	0.002	0.253	0.062	0.000	0.681	0.126	0.040	0.639	0.136	0.037
Log of Income	-0.263	0.062	0.000	-0.139	0.069	0.046	0.052	0.059	0.380	-0.011	0.070	0.880
Debt	1.544	0.254	0.009	1.658	0.324	0.011	1.003	0.225	0.989	1.222	0.270	0.367
Material Deprivation	0.325	0.107	0.003	0.358	0.111	0.002	0.008	0.087	0.925	0.020	0.094	0.832
Subjective Social Status	-0.422	0.119	0.001	-0.497	0.179	0.006	-0.204	0.138	0.143	-0.255	0.150	0.092
Welfare	1.474	0.259	0.029	2.034	0.429	0.001	0.992	0.238	0.975	1.160	0.280	0.540
<b>N</b>	2,779						2,588					

**Notes:** Weighted Regression Analysis. Sig provides p-value.

Reference Category for Obesity Trajectories: Stay or Reduce to Nonobese

These models control for family SES at WI, race/ethnicity, age and AHPVT

**Table 3: Bivariate Relationship Between Obesity Trajectories and Wave 3 and Wave 4 Mechanisms**

	Female						Male					
	Become Obese			Stay Obese			Become Obese			Stay Obese		
	Mean	SE	Sig	Mean	SE	Sig	Mean	SE	Sig	Mean	SE	Sig
<b>Wave 3 Mechanisms</b>												
CESD	0.276	0.145	0.058	0.268	0.192	0.165	-0.089	0.119	0.460	-0.245	0.114	0.034
Self Esteem	-0.435	0.203	0.034	-0.469	0.292	0.111	-0.211	0.249	0.398	0.325	0.238	0.175
Interviewer Attractive Scale	-1.095	0.139	0.000	-1.110	0.167	0.000	-0.262	0.126	0.039	-0.619	0.160	0.000
Attractive Scale + Int Controls	-1.118	0.138	0.000	-1.129	0.168	0.000	-0.253	0.126	0.047	-0.587	0.160	0.000
<b>Wave 4 Mechanisms</b>												
Friends	-0.324	0.194	0.098	-0.346	0.282	0.222	-0.613	0.214	0.005	-0.515	0.241	0.035
Discrimination	0.119	0.060	0.050	0.102	0.083	0.221	0.046	0.062	0.460	0.005	0.079	0.946
Discrimination + Race/Ethnicity	0.125	0.058	0.034	0.109	0.083	0.193	0.046	0.062	0.455	0.006	0.079	0.943
General Health Status	-0.577	0.067	0.000	-0.592	0.086	0.000	-0.376	0.067	0.000	-0.538	0.093	0.000
Missed Work Days	0.084	0.051	0.102	0.044	0.047	0.355	-0.026	0.036	0.470	0.048	0.056	0.399
Currently Married	-0.029	0.041	0.476	-0.070	0.042	0.096	0.043	0.043	0.319	0.036	0.039	0.363
<b>N</b>	2,779						2,588					

**Notes:** Weighted Regression Analysis. Sig provides p-value.

Reference Categories for Obesity Trajectories: Stay or Reduce to Nonobese