Youth Energy Balance:
Evaluating the Impact of Family and Economic Trajectories

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In the United States, approximately 25 percent of children are overweight (Hill and Peters, 1998). In recent years, overweight has become the most prevalent nutrition-related disease among youth (Dietz, 1998). Adult overweight is also on the rise, with current research estimating that rates of adult overweight increased from 25% in the 1970s to 33% in the 1990s (Kuczmarski et al., 1994; Troiano and Flegal, 1998).

The overweight epidemic carries serious implications for morbidity and mortality, and places additional burdens on the health care system. Premature maturation, hyperlipidemia, hypertension, and abnormal glucose tolerance occur more frequently among overweight children and adolescents (Dietz, 1998). The number of physician visits related to overweight has increased 88% in the last six years (Wolf, 1998). The economic costs of overweight are estimated to be 6 percent of the $1 trillion national health expenditure. Furthermore, given the health risks present for both children and adult, there is growing appreciation that investigating the etiology of childhood overweight is important to understanding overweight among adults. Although childhood onset of overweight only accounts for 25 percent of the occurrence of adult overweight, obese adults who were overweight as children have much more severe obesity than adults who became obese in adulthood (Dietz, 2002).

Extant literature on overweight has focused on proximal predictors such as calorie intake, physical activity (Gorden-Larsen et al, 2000), television watching and playing video games (Anderson, et al. 1998). Other research has considered more distal factors such as economic circumstances. For example, poor children may disproportionately be kept indoors because of lack of supervision, paucity of recreational options, and safety concerns, thereby limiting children's physical activity. Past research has found that higher income women are less likely to be overweight, but fewer studies have tested such relationships among children. Some of the available research on children has found an inverse relationship between income and child overweight such that girls from low-income families were more likely to be overweight than those from high income families (Alaimo et al, 2001). Yet other research has found a higher risk of overweight among middle income but not high or low-income children (Hofferth and Curtin, 2003). Research that can relate trajectories in family income to young adult energy balance and well being may be better able to disentangle some of the contradictory findings present in the literature.

Much of the available research linking overweight and children has been cross-sectional in design (Anderson et al. 1998; Dietz and Gortmaker, 1985). Fewer research investigations have considered longitudinal predictors of youth energy balance and well being. In this paper, we explore how family economic and energy balance history may be linked to youth overweight and development. Studies examine child's ethnicity, age, and gender, but rarely include dynamic trajectories of familial BMI or economic constraints. In our study, we exploit the longitudinal nature of the NLSY to create long-term family economic and family BMI profiles. Finally, we track the impact of these profiles for key subgroups of youth (.e.g., those youth still living at home and those who have left the parental home). The ways in which family background and income affect the energy balance and well being of youth still in high school may well be different than the impact for youth living in independent residential situations.

Data

We use the 2004 release of Young Adult data from National Longitudinal Survey of Youth 1979 (NLSY79) to explore the relationships among maternal BMI, family income, family background variables and youth overweight and healthy behaviors. The initial wave of the NLSY79 was administered in 1979

to respondents aged 14 to 22. Follow up interviews were conducted annually until 1994 and biennially since then. The offspring of the women in this sample have been sampled starting in 1986 and biennially until the present. With these data, it is possible to link detailed longitudinal information on mothers and their children. Preliminary data shown in Figure 1 and in Figure 2 indicate considerable trajectories of youth and maternal overweight in this sample.

In the NLSY, there is height and weight information on 1,934 young adults who are between the ages of 14 and 18, and on 1,667 young adults who are between the ages of 19 and 22. We also have information on health behaviors such as intake of fruits and vegetables as well as energy output. We also have detailed BMI history of young adults as well as their mothers and other family members based on weight and height information gathered at the time of each interview.

Using the NLSY data, we investigate differences in young adult BMI across created categories of "family weight saturation" for two important transition points in youth development: coresidence with parents and independent living situations. To capture family weight saturation, we categorize youth's family setting along dimensions of whether their mother has had consistently high BMI, consistently low BMI, or whether there have been fluctuations in maternal weight. We also consider dynamics of youth BMI status as well. A youth who is living in a setting that is characterized by maternal BMI fluctuation may have different approach to optimum energy balance than youth who spends the majority of his or her lifetime in a household where there are more consistent patterns of family energy balance maintenance.

Using multivariate techniques, we also relate these trajectories of familial BMI and economic well being to healthy youth behaviors such as engaging in exercise and the consumption of fruits and vegetables. We consider three different measures of economic well-being that may influence youth BMI: permanent household income (as measured by average household income over the preceding interview years), permanent income adjusted for basic household needs, and the fraction of the time the household's income has been below a poverty or near-poverty threshold.

Our investigation controls for maternal characteristics such as mother's scholastic aptitude, measured by AFQT, maternal education, employment status, and age. Family characteristics such as family size, region and urbanicity of residence, child low birth weight are also controlled in the analyses. We will explore weight gain related to fertility among the girls, as this may be an important confound to our analyses. Because child overweight varies by race, as shown in Figure 1 and in Figure 2, we estimate separate models by ethnicity. Results from this research afford valuable insights into complexity of family contributions to youth energy balance.

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Figure 1. Mean NLSY Young Adult BMI 1994 to 2002

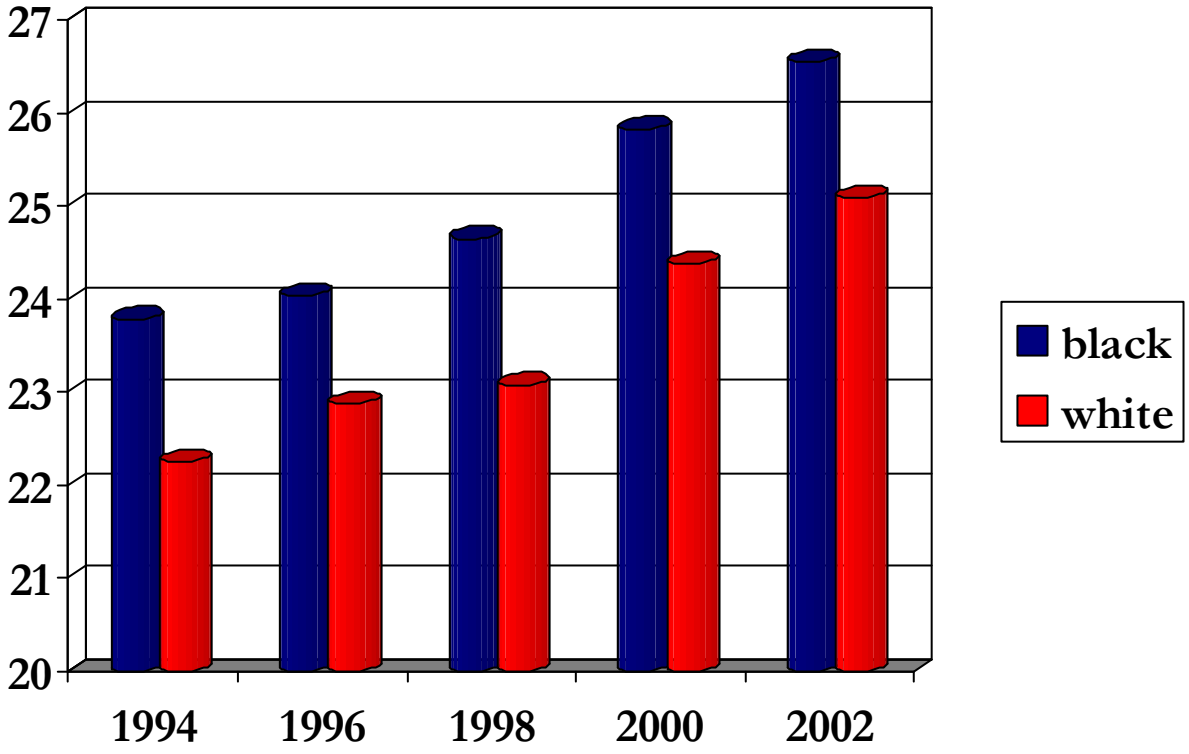

Figure 2. Mean BMI for NLSY79 Mothers 1986 to 1998