# Impacts of Economic and Psychological Factors on Women's Obesity and Food Assistance Program Participation: Evidence from the NLSY Panel

Ying Huang, Wallace Huffman, and Abebayehu Tegene

Gibson (2003), Fox, Hamilton, and Lin (2004), Chen, Yean and Eastwood (2005), and Meyerhoefer and Pylypchuk (2008) have attempted to link an individual's participation in the Food Stamp Program (FSP) or the Supplemental Nutrition Assistance Program (SNAP) and obesity. The administration of the FSP may lead participating households to cycle through "many mini feast and famine periods," leading to unhealthy eating habits. However, panel data permit investigating long-run effects of FSP participation on obesity.

Psychologists suggest that an individual's psychological traits, such as motivation and self control, affect his or her behaviors (Dunifon and Duncan 1998) and Heckman, Stixrud and Urzua (2006) have started to look at effects of these variables on economic behaviors. The objective of this paper is to examine women's lifestyle choices on a healthy weight, as reflected in body mass index (BMI) or being obese and food stamp program (SNAP) participation in panel data. The primary data set is the National Longitudinal Data Survey of Youth, 1979 (NLSY79), and we use data from the 1990, 1994, 1998, 2002 and 2006 rounds. With the geocode for each household, we are able to merge secondary data on local food, drinks and health care prices and labor market conditions to the adults in the NLSY79. The paper provides some new insights on women's health as reflected in BMI and food stamp program participation. The paper has four sections.

## Econometric Model

Decisions are made in a productive household model where heath is produced and consumed (Chen and Huffman 2010, Huffman et al. 2010). The representative agent makes her decisions on time allocated to leisure, production of health and labor supply and on food, medical care and other consumption goods, and participation in the Food Stamp Program (FSP). Decisions are constrained by the health production function, time endowment and cash income each period. The econometric model focuses on adult choices of a healthy weight, food stamp program participation and labor force participation. Since an adult's weight may affect his or her wage rate, and hence, the opportunity cost of time, we fit a wage equation and use it to instrument an individual's price of time. Four equations will be estimated.

An individual's body weight changes when there is energy imbalance. The household's supply of female health indexed by BMI or being obese is:

First, Food stamp program (SNAP) participation might affect BMI in two ways. First, past participation might contribute to unhealthy eating habits, which increase current BMI. Second, current program participation might have an immediate impact on BMI, tending to increase BMI. The failure to accommodate the possible endogeneity of the FSP participation

Ying Huang, Wallace Huffman (whuffman@iastate.edu) and Abebayehu Tegene are Ph.D. student and C.F. Curtiss Distinguished Professor of Agriculture and Economics, Iowa State University, and Branch Chief, Food Economics Division, ERS. On an earlier draft, Diane Schanzenbach, Joseph Herriges, Peter Orazem, and Ruth Litchfield provided helpful comments. Financial support was obtained from the USDA in a cooperative agreement and from the Iowa Agriculture and Home Economics Experiment Station. The content of this paper does not reflect the views of the USDA.

This article was presented in an invited paper session at the 2011 ASSA annual meeting in Denver, CO. The articles in these sessions are not subjected to the journal's standard refereeing process.

*Amer. J. Agr. Econ.* 94(2): 331–337; doi: 10.1093/ajae/aar101
Published on October 19, 2011

$$\begin{aligned}\ln BMI_i[or\ D(Obese)_i] = {} & \beta_1 D(FSP) + \beta_2 \ln Wage_i + \beta_3 PR\_FFruVeg_i + \beta_4 PR\_PFruVeg_i \\ & + \beta_5 PR\_Meat_i + \beta_6 PR\_Dairy_i + \beta_7 PR\_Alco_i + \beta_8 PR\_NAlco_i + \beta_9 PR\_FF_i \\ & + \beta_{10} PR\_HC_i + \beta_{11} Inc_i + \beta_{12} Inc_i^2 + \beta_{13} LagFSP + \beta_{14} Edu_i + \beta_{15} NonCogAb_i \\ & + \beta_{16} BMI86_i + \beta_{17} BMI86_i^2 + \beta_{18} Height_i + \beta_{19} Age_i + \beta_{20} Age_i^2 + \beta_{21} Married_i \\ & + \beta_{22} Kids_i + \beta_{23} Race_i + \beta_{24} Urban_i + \beta_{25} SMSA_i + c_1 + \mu_{1i} \end{aligned} \tag{1}$$

decision in past studies can lead to inconsistent estimates of the effects of FSP participation on BMI. Second, the opportunity cost of time is important to health production and household consumption decisions. If an individual's price of time is high, then he or she will tend to conserve on time-intensive activities. Recreational exercise is a time-intensive activity, but it also contributes to a healthy weight. On the other hand, individuals with a higher opportunity cost of time may try to build their health more effectively and efficiently, if they spend some time on physical activities, by hiring professional trainers. Chen and Huffman (2010) find that as women's wage rate increases, other things equal, they are more likely to be obese.

Third, food and drinks are consumed to obtain nutrients (carbohydrates, fats, protein, vitamins and minerals), to feel good (i.e., comfort food), and to socialize. The prices of disaggregated food and drinks are one set of factors that are expected to affect choices of food and drinks as well as physical activities, and thus affect her body weight (Chen and Huffman 2010). An increase in the price of fresh fruits and vegetables is expected to reduce an individual's consumption of these products and to lead to a higher BMI or probability of being obese, other things equal. Processed fruits and vegetables are less healthful than fresh because they contain significant amounts of added sugar. An increase in the price of meats and fish is expected to reduce an individual's consumption of these foods, which tend to be calorie dense, and may lead to a lower BMI and probability of being obese. Similarly, since most fast foods are calorie dense, an increase in the price of fast foods is expected to reduce an individual's consumption of these foods and lead to a lower BMI and probability of being obese.

Fourth, household nonlabor income is expected to lower a female's BMI or probability of a being obese (Chen and Huffman 2010). Fifth, an individual's education increases his/her labor market skills, and skills in general, for decision making (Schultz 1975, Speakman et al. 2005). Individuals with more education are expected to make healthier lifestyle choices. However, added education increases the likelihood that an individual selects a sedentary job, which is a potential cause for overweight. Chen and Huffman (2010) find that women with higher levels of education are less likely to be obese. The effects of own education could increase or decrease the likelihood of being obese or having a larger BMI.

Sixth, as suggested in Heckman et al. (2006), an individual's lifestyle choices may be affected by her noncognitive abilities. If a woman exhibits internal control or high self-esteem, we expect her to take responsibility for her own actions and pursue a healthy lifestyle, including a healthy weight. Seventh, early adult BMI is expected to signal early lifestyle habits and genetic propensity for an unhealthy weight or being obese (Chen and Huffman 2010).

Current FSP (SNAP) participation is a household decision, given eligibility. Most FSP rules are set at a federal level, but states do have a say about some administrative features such as the length of the eligibility certification periods, the design of outreach programs and about any "workfare" requirements for participation in the program. Households have to go through an eligibility determination, and monthly cash income and assets are the main determinant of eligibility. We simplify and assume that the potential food stamp program award is related to the respondent's wage rate, household nonlabor income, marital status and number of children. The reservation award includes variables that affect the value of the first dollar of food stamps received, including an adjustment for stigma from participation,

and is similar to the concept of the reservation wage. An individual participates in the FSP when the potential award from participation is greater than her reservation award:

$$
\begin{aligned}
D(FSP)_i = {} & \theta_1 \ln Wage_i + \theta_2 PR\_FFruVeg_i + \theta_3 PR\_PFruVeg_i + \theta_4 PR\_Meat_i \\
& + \theta_5 PR\_Dairy_i + \theta_6 PR\_Alco_i + \theta_7 PR\_NAlco_i + \theta_8 PR\_FF_i + \theta_9 PR\_HC_i + \theta_{10} Inc_i \\
& + \theta_{11} Inc_i^2 + \theta_{12} LagFSP_i + \theta_{13} Edu_i + \theta_{14} NonCogAb_i + \theta_{15} BMI86_i + \theta_{16} BMI86_i^2 \\
& + \theta_{17} Height_i + \theta_{18} Age_i + \theta_{19} Age_i^2 + \theta_{20} Married_i + \theta_{21} Kids_i + \theta_{22} Race_i \\
& + \theta_{23} Urban_i + \theta_{24} SMSA_i + \theta_{25} Ed\_Moth_i + \theta_{26} NoEdM_i + \theta_{27} Urban\_14_i \\
& + \theta_{28} South\_14_i + \theta_{29} D(1996) + c_2 + \mu_{2i} \qquad (2)
\end{aligned}
$$

Participation is time consuming, and women who have a high opportunity cost of time are expected to be less likely to participate, other things equal. Participation seems more likely if the prices of "expensive" food items like fresh meat and fish are high. Women who are married and have larger household nonlabor income are less likely to participate. However, families with more children are more likely to participate. Also, past FSP participation is expected to reduce the reservation utility of current participation and lead to an increase in the current FSP participation (Keng, Garasky and Jensen 2002).

We consider the impact of a woman's human capital, noncognative ability, and early BMI on women's wage rates and control for selection:

$$
\begin{aligned}
\ln Wage_i = {} & \pi_1 Edu_i + \pi_2 NonCogAb_i + \pi_3 BMI86_i + \pi_4 BMI86_i^2 + \pi_5 Height_i \\
& + \pi_6 Age_i + \pi_7 Age_i^2 + \pi_8 Race_i + \pi_9 Urban_i + \pi_{10} SMSA_i + \pi_{11} Ed\_Moth_i \\
& + \pi_{12} NoEdM_i + \pi_{13} Ed\_Fath_i + \pi_{14} NoEdF_i + c_3 + \mu_{3i} \qquad (3)
\end{aligned}
$$

An individual's wage is expected to increase with cognitive skills (as indexed by education level) and non-cognitive abilities (Muller and Plug 2006). A women's age and age-squared are used as a proxy for her potential labor market experience after completing schooling. Early BMI is also expected to affect a woman's current wage, as in Cawley (2004) and Chen and Huffman (2010). Non-white women are expected to earn less than white women.

Women and households make work decisions; women are assumed to work for a wage when their opportunity cost of their time (or the reservation wage) is less than their wage offer. The supply of health or BMI, and the demand for leisure and housework are assumed to be determined by roughly the same set of variables. However, adjustments are made to aid identification of the econometric model. All equations also include a time trend and Census region dummy variables.

## The Data, Sample and Empirical Definitions of Variables

The primary data for the empirical analysis are women in the National Longitudinal Survey of the Youth, 1979 Cohort. The National Longitudinal Survey of the Youth, 1979 Cohort (NLSY79) is a nationally representative sample of 12,686 young men and women who were 14–22 years old when they were first surveyed in 1979. We extract observations on adult women from 5 rounds of NLSY79 survey, 1990, 1994, 1998, 2002 and 2006.[1] Data on local food, drinks and health care prices are taken from ACCRA data for 1989, 1993, 1997, 2001 and 2005. With geocode information in the NLSY79, the secondary data on prices can be matched to particular adults. There are a total of 11,957 observations in the female sample. Table 1 contains variable names and summary statistics.

An individual's weight index is BMI or body mass index: an individual's body weight (in

[1] Women with extreme values for BMI and missing data on weight are excluded from the sample.

**Table 1. Variable Definitions and Sample Summary Statistics**

| Variable | Definition | Mean (sd) |
|---|---|---|
| *BMI* | Current BMI, defined as weight/square of height (in kg/m$^2$) | 25.90(5.08) |
| *D*(*Obese*) | = 1 if the individual is obese (BMI≥30); = 0 otherwise | 0.214(0.41) |
| *D*(*FSP*) | = 1 if the individual currently participates in the Food Stamp Program; = 0 otherwise | 0.073(0.26) |
| *Wage* | The individual's average hourly wage rate, constant prices | 12.39(29.3) |
| *D(empl)* | =1 if the individual works for pay; =0 otherwise | 0.921(0.27) |
| *PR_FFruVeg* | Local price of fresh fruits and vegetables, constant prices | 0.858 |
| *PR_PFruVeg* | Local price of processed fruits and vegetables, constant prices | 0.854 |
| *PR_Meat* | Local price of meat and fish, constant prices | 0.867 |
| *PR_Dairy* | Local price of diary food, constant prices | 0.863 |
| *PR_Alco* | Local price of alcoholic drinks, constant prices | 0.848 |
| *PR_NAlco* | Local price of non-alcoholic drinks, constant prices | 0.847 |
| *PR_FF* | Local price of fast food, constant prices | 0.851 |
| *PR_HC* | Local price of health care, constant prices | 0.863 |
| *Inc* | Household non-wage income (in 100,000 constant dollars) | 0.089(0.35) |
| *LagFSP* | total amount the individual received from the Food Stamp Program in the last calendar year | 149.92(885) |
| *Edu* | The highest grade completed by the individual | 11.60(4.61) |
| *Self-Esteem* | The Rosenberg Self-Esteem Scale (1979) | 32.23(3.99) |
| *Locus of Control* | The Rotter Internal-External Locus of Control Index (1979) | 11.59(1.48) |
| *BMI*86 | BMI in 1986 | 22.95(3.91) |
| *Height* | Women's height in centimeters | 164(6.67) |
| *Age* | Current age | 36.33(5.98) |
| *Married* | = 1 if the individual is married and the spouse is present; = 0 otherwise | 0.563(0.50) |
| *Kids* | Number of children in the household under age 5 | 1.40(1.21) |
| *Black* | = 1 if the individual is black; = 0 otherwise | 0.273 |
| *Raceoth* | = 1 if the individual is neither white nor black; = 0 otherwise | 0.159 |
| *Urban* | = 1 if the individual lives in an urban area; = 0 otherwise | 0.744 |
| *SMSA* | = 1 if the individual lives in SMSAs; = 0 otherwise | 0.605 |
| *Ed_Moth* | The highest grade completed by the woman's mother | 10.53(3.72) |
| *NoEdM* | = 1 if *Ed_Moth* is missing; = 0 otherwise | 0.043 |
| *Ed_Fath* | The highest grade completed by the woman's father | 9.66(5.12) |
| *No EdF* | = 1 if *Ed_Fath* is missing; = 0 otherwise | 0.128 |
| *South_14* | = 1 if woman lived in the south at age 14; = 0 otherwise | 0.780 |
| *Urban_14* | = 1 if the individual lived in an urban area at age 14; = 0 otherwise | 0.394 |
| *D*(1996) | = 1 if survey round in 1998, 2002 or 2006; = 0 otherwise | 0.606 |
| *Preg* | = 1 if woman is pregnant; 0 = otherwise | 0.032 |
| *Region* | | |
| *NE* | = 1 if individual lives in northeast; = 0 otherwise | 0.123 |
| *NC* | = 1 if individual lives in middle west; = 0 otherwise | 0.258 |
| *South* | = 1 in the individual lives in south; = 0 otherwise | 0.430 |
| *West* | = 1 if the individual lives in west; = 0 otherwise | 0.189 |
| *Trend* | 1(1990), 2(1994), 3(1998), 3(2002), 4(2006) | |

kilograms) divided by the square of his or her height (in meters). Persons with BMI ≥ 25(kg/m$^2$) are classified as overweight, and persons with BMI ≥ 30(kg/m$^2$) are classified as obese. The survey asked the respondents about the detailed information on the Food Stamp Participation in all rounds. If the respondent received any food stamps during the reported year, the index for FSP participation equals 1, otherwise it is 0. Past food stamp program participation is represented by the amount of benefits that the household received during the last calendar year.

Using the American Chamber of Commerce Researchers Association (ACCRA) data, we develop food and drink prices, including at home and away from home, and health care prices. See table 1 for these definitions and Chen and Huffman (2010) for details on prices. The NLSY provides a measure of an adult's

**Table 2. IV Estimation of Behavioral Model for Women's BMI and FSP Participation (z-Values in Parentheses)[a]**

| Variable | *lnBMI* | *D*(*Obese*) | *D*(*FSP*) | *lnWage* | *D*(*empl*) |
|---|---|---|---|---|---|
| *D*(*FSP*) | 0.014 | 0.139 | | | |
| | (1.32) | (0.99) | | | |
| *lnWage* | −0.059 | −0.599 | −0.321 | | |
| | (−6.02) | (−4.31) | (−0.83) | | |
| *PR_FFruVeg* | 0.037 | 0.300 | −0.062 | | −0.905 |
| | (1.82) | (1.04) | (0.14) | | (−2.53) |
| *PR_PFruVeg* | 0.116 | 1.830 | 0.048 | | −1.687 |
| | (3.45) | (3.94) | (0.07) | | (−3.39) |
| *PR_Meat* | −0.025 | −0.782 | 0.138 | | 1.118 |
| | (−0.77) | (−1.72) | (0.19) | | (2.04) |
| *PR_Dairy* | −0.063 | −0.972 | 0.079 | | 0.448 |
| | (−2.44) | (−2.69) | (0.14) | | (1.18) |
| *PR_Alco* | 0.015 | −0.001 | −1.136 | | 2.118 |
| | (0.63) | (−0.00) | (2.17) | | (4.80) |
| *PR_NAlco* | 0.005 | 0.172 | 0.137 | | 0.356 |
| | (0.20) | (0.47) | (0.24) | | (0.79) |
| *PR_FF* | 0.029 | 0.708 | −1.612 | | −0.069 |
| | (0.62) | (1.10) | (−1.57) | | (−0.09) |
| *PR_HC* | −0.009 | 0.079 | −1.348 | | 1.229 |
| | (−0.41) | (0.27) | (−2.91) | | (3.12) |
| *Inc* | −0.025 | −0.204 | −0.927 | | 0.221 |
| | (−3.28) | (−1.91) | (−2.49) | | (2.24) |
| $Inc^2$ | 0.003 | 0.038 | 0.143 | | −0.095 |
| | (1.47) | (1.25) | (0.96) | | (−3.93) |
| *LagFSP* | 0.000 | 0.000 | 0.001 | | −0.000 |
| | (1.15) | (0.73) | (34.32) | | (−7.07) |
| *Edu* | 0.001 | 0.014 | −0.060 | 0.015 | 0.031 |
| | (3.63) | (2.82) | (−5.25) | (9.33) | (4.80) |
| *Self-Esteem* | 0.001 | 0.010 | −0.014 | 0.025 | 0.022 |
| | (3.60) | (1.68) | (−1.15) | (13.54) | (4.35) |
| *Locus of Control* | −0.001 | −0.013 | −0.008 | −0.006 | −0.016 |
| | (−1.49) | (−1.15) | (−0.46) | (−1.21) | (−1.21) |
| *BMI*86 | 0.094 | 0.556 | 0.023 | −0.030 | 0.142 |
| | (35.48) | (11.73) | (0.43) | (−1.78) | (3.34) |
| $BMI86^2$ | −0.001 | −0.006 | −0.000 | 0.000 | −0.003 |
| | (−23.47) | (−6.95) | (−0.28) | (0.97) | (−3.30) |
| *Height* | 0.000 | 0.001 | −0.003 | 0.006 | −0.001 |
| | (1.23) | (0.51) | (−0.79) | (5.19) | (−0.27) |
| *Age* | 0.008 | 0.132 | −0.195 | 0.052 | −0.013 |
| | (3.06) | (3.25) | (−2.82) | (3.25) | (−0.20) |
| $Age^2$ | −0.000 | −0.002 | 0.002 | −0.001 | −0.000 |
| | (−4.01) | (−3.95) | (2.57) | (−2.84) | (−0.09) |
| *Married* | 0.019 | 0.121 | −0.610 | | 0.011 |
| | (7.04) | (3.17) | (−10.76) | | (0.24) |
| *Kids* | −0.002 | −0.020 | 0.104 | | −0.106 |
| | (−2.34) | (−1.37) | (5.13) | | (−6.61) |
| *Black* | 0.044 | 0.304 | 0.412 | −0.117 | −0.054 |
| | (12.44) | (6.34) | (4.91) | (−6.42) | (−1.02) |
| *RaceOth* | 0.023 | 0.085 | 0.031 | 0.116 | 0.032 |
| | (6.25) | (1.63) | (0.33) | (4.87) | (0.49) |
| *Urban* | 0.003 | 0.051 | −0.168 | 0.101 | 0.113 |
| | (0.97) | (1.13) | (−2.21) | (5.56) | (2.28) |
| *SMSA* | 0.005 | 0.023 | 0.091 | 0.069 | −0.198 |
| | (1.59) | (0.54) | (1.34) | (4.02) | (−3.51) |
| *Ed_Moth* | | | −0.018 | 0.022 | |
| | | | (−1.09) | (7.25) | |

*Continued*

**Table 2. Continued**

| Variable | *lnBMI* | *D*(*Obese*) | *D*(*FSP*) | *lnWage* | *D*(*empl*) |
|---|---|---|---|---|---|
| *NoEdM* | | | −0.062 | 0.170 | |
| | | | (−0.36) | (3.51) | |
| *Ed_Fath* | | | | 0.022 | −0.011 |
| | | | | (9.00) | (−1.74) |
| *NoEdF* | | | | 0.163 | −0.263 |
| | | | | (4.91) | (−3.17) |
| *Urban_14* | | | −0.056 | | −0.072 |
| | | | (−0.91) | | (−1.42) |
| *South_14* | | | −0.098 | | 0.051 |
| | | | (−1.16) | | (0.79) |
| *D*(1996) | | | 0.714 | | |
| | | | (4.26) | | |
| *Preg* | | | | | −0.100 |
| | | | | | (−0.58) |
| *D(empl)* | | | | 1.249 | |
| | | | | (7.95) | |
| *Time Trend* | 0.051 | 0.417 | 0.315 | 0.287 | −0.648 |
| | (10.14) | (6.01) | (2.05) | (19.49) | (−8.17) |
| $R^2$ | 0.5862 | 0.3633 | 0.5048 | 0.3111 | 0.2102 |

[a] The $2^{nd}$, $3^{rd}$ and $5^{th}$ equations are estimated by probit maximum likelihood. Equations 1 and 3 are least squares. All estimations also include four region dummies in the reported year.

hourly wage. Household nonlabor income is total family income less respondent's earnings. The food, drink and health prices and household nonlabor income are expressed in constant prices using the implicit price deflator for personal consumption expenditures of U.S. Department of Commerce.

Noncognitive ability is represented by responses in 1979–80 to questions developed by Rotter (1966) to assess internal-external locus of control and by Rosenberg (1965) to assess self-esteem. Rotter's scale measures the extent to which an individual believes that she has control over her live through self-motivation or self-determination (internal control), represented by small values, as opposed to the extent that the environment (i.e., chance, fate, luck) controls her life (external control), represented by large values. The Rosenberg Self-Esteem Scale measures the self-evaluation that an individual makes and customarily maintains. A larger value means an individual has higher self- esteem.

## Estimation and Results

Our data are at four year intervals and we control for individual heterogeneity using observables; later research will examine random and fixed effects. We instrument for the probability that a woman is currently in the labor force, probability she is participating in the food stamp program and her wage. Our estimation is best described as a type of IV estimation; no cross-equation correlation of disturbances is incorporated.

Due to limited space, we discuss only a few results. An individual's labor force participation is perhaps surprisingly affected by food and drink prices and the price of health care. Women who have more education and high self-esteem are more likely to participate in the labor force. A larger BMI86 increases the probability of women working up to a BMI of 23.7, which is a near ideal weight, and thereafter, a larger BMI reduces her probability of working. Women whose household has in the past participated in the FSP are significantly less likely to work currently.

Women who have more education receive a significantly higher wage, a common result. Women who have high self-esteem and believe that external events control also earn a significantly higher wage. Women who are taller earn significantly more, but a larger early BMI imposes a penalty and reduces their wage.

Decisions to participate in the FSP are not sensitive to the women's wage or the price of food and drink. A woman with more education, who is in a household with more nonlabor income and who is married

is significantly less likely to participate in the FSP. Women who are younger, with more children and who are black are significantly more likely to participate in the FSP. However, non-cognitive ability and early BMI have no impact on FSP participation. The single strongest determinant of current FSP participation is having participated in the FSP in the past.

An increase in a woman's wage and in the price of dairy products reduces her current BMI, but a higher price of fresh and processed fruit and vegetables increases it. Women who have more education, higher self-esteem and are black or of other races also have a higher BMI. A women with a larger household non-labor income have a lower BMI or less likely to be obese, as shown by Chen and Huffman (2010). Although a woman's current and past participation in the FSP have positive effects on current BMI, the effects are not significant. The single strongest determinant of current BMI is her BMI in 1986, showing persistence of earlier tendencies.

## Conclusions

Women who are married, have more education, a larger household non-labor income, few children and are non-black are less likely to participate in the FSP. Non-cognitive ability has no effect on women's FSP participation. The strongest predictor of current FSP participation is past participation. Current BMI of women is higher where the local price of fresh and processed fruits and vegetables are higher and price of dairy products is lower. Women who have more education and high self-esteem have a higher current BMI. Current and past FSP program participation tend to increase BMI, but these effects are not statistically strong. Early BMI is a strong predictor of current BMI.

## References

Chen, Y. and W.E. Huffman. 2010. "Factors Affecting Healthy Choices of Middle-Aged Adults: An Economic Perspective." Iowa State University, Department of Economics, September 9.

Chen, Z., S.T. Yean, and D.B. Eastwood. 2005. "Effects of Food Stamp Participation on Body Weight and Obesity." *American Journal of Agricultural Economics* 87: 1167–1173.

Dunifon, R., and G.J. Duncan. 1998. "Long-Run Effects of Motivation on Labor-Market Success." *Social Psychology Quarterly* 60: 33–48.

Fox, M.K., W. Hamilton, and B.H. Lin. 2004. "Effects of Food Assistance and Nutrition Programs on Nutrition and Health. Vol. 4, Executive Summary of the Literature Review", *Food Assistance and Nutrition Research Report* No. 19-4, November.

Gibson, D. 2003. "Food Stamp Program Participation is Positively Related to Obesity in Low Income Women." *The Journal of Nutrition* 133: 2225–2231.

Heckman, J. J., J. Stixrud, and S. Urzua. 2006. "The Effects of Cognitive and Noncognitive Abilities on Labor Market Outcomes and Social Behaviors." *Journal of Labor Economics* 24: 411–482.

Huffman, W.E., S.K. Huffman, A. Tegene, and K. Rickertsen. 2010. "The Economics of Obesity-Related Mortality Among High Income Countries". *Forum for Health Economics and Policy*, 13, Article 1:1–42.

Keng, S.H., S. Garasky, and H.H. Jensen. 2002. "Welfare Dependence and Recidivism in an Era of Welfare Reform." *Applied Economics* 34: 2311–2323.

Meyerhoefer, C.D. and Y. Pylypchuk. 2008. "Does Participation in the Food Stamp Program Increase the Prevalence of Obesity and Health Care Spending?." *American Journal of Agricultural Economics* 90: 287–305.

Muller, G. and E.J.S. Plug. 2006. "Estimating the Effect of Personality on Male and Female Earnings." *Industrial & Labor Relations Review*. 60: 1–22.

Rosenberg, M. 1965. "*Society and the Adolescent Self-Image*." Princeton, N.J.: Princeton University Press.

Rotter, J.B. 1966. "Generalized Expectancies for Internal Versus External Control of Reinforcement." *Psychological Monograph* 80: 1–28.

Schultz, T.W. 1975. "The Value of the Ability to Deal with Disequilibria." *Journal of Economic Literature* 13: 827–846.

Speakman, J.R., H. Walker, L. Walker, and D.M. Jackson. 2005. "Association between BMI, Social Strata and the Estimated Energy Content of Foods." *International Journal of Obesity* 29: 1281–1288.