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Perceptions and Misperceptions of Health Among Different Groups in the United States

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PERCEPTIONS AND MISPERCEPTIONS OF HEALTH AMONG DIFFERENT GROUPS IN THE UNITED STATES

BY

KATHERINE BASS

B.A.,ECONOMICS, UNIVERSITY OF NEW MEXICO, 2006

THESIS

Submitted in Partial Fulfillment of the
Requirements for the Degree of

Master of Arts
Economics

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ABSTRACT

The prevalence of unhealthy habits and behaviors is undeniably felt and seen here in United States. Smoking and obesity are the two leading preventable causes of death today. The economic and societal costs are too high for such a preventable problem. The associated diseases and illnesses that stem from them account for billions of dollars in medical expenditures as well as billions more in lost productivity. This paper explores the degree to which people in different groups account for poor health habits.

Using data from the National Health Interview Survey, the self-reported health status was used to determine the effect health habits had on the respondents' perception of their health. The findings indicate that perceptions of health vary across age, years in the United States, race, and gender. Using this, policymakers can target different groups of people in a more successful way by aiming at the areas that most affect their perception of health. Through this process they can impact the lifestyle choices of those people towards a healthier way of living.

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Chapter 1 Health Habits, Behaviors, and Perceptions

1.1 Impact of Health Choices

Smoking, lack of exercise, and unhealthy eating contribute to diseases that are otherwise preventable. Even though the personal and societal costs of these diseases are very high, unhealthy lifestyles are increasingly common. This thesis explores the apparent disjunction between people's health habits and their self-assessed health status. A better understanding of how people perceive their health should contribute to policies that encourage healthier life styles.

Tobacco use and obesity are the two leading preventable causes of death in the United States. Billions of dollars are spent each year on medical expenditures related to the resulting illnesses and diseases attributed to these two health habits. Despite the widespread publicity on these potentially deadly side effects, obesity in the US has been steadily increasing since the 1980s and in 2006 an estimated 20 percent of the adults were current smokers (American Lung Association 2008). This suggests that either there is a lack of awareness of the resulting diseases or people are ignoring the consequences of their actions.

America has the highest obesity rates in the world: in 2006, 67 percent of adults were overweight or obese, and 35 percent were obese. The Center for Disease Control and Prevention (CDC) reported that in 1998 obesity-attributed medical expenditures were between $51.5 and $78.5 billion with Medicaid and Medicare accounting for roughly 48 percent of those costs (Finkelstein *et al.* 2003).

This includes health care costs attributed to the associated chronic diseases and illnesses due to obesity. Such chronic diseases include type 2 diabetes, cardiovascular disease, musculoskeletal disorders, sleep apnea, gallbladder disease and several types of cancer (endometrial, postmenopausal breast, kidney, and colon) (CDC 2002). The cost estimate above does not include the obesity-related expenditures due to lost of productivity. The economic cost is extremely high especially for such a preventable health issue, which makes it an important concern for policymakers.

Over the past two decades, overweight and obesity rates have drastically increased as shown in Figure 1.1. The person's Body Mass Index (BMI) determines the classifications of overweight and obese. The BMI represents a person's weight to height ratio using the equation (Weight in lbs/ 2.205)/ (height in inches/ 39.37)^2. Overweight is defined as a BMI of greater than or equal to 25 and obese is defined as a BMI of greater than or equal to 30. Data from the National Health Interview Survey (NHIS) for 2006 identify 61 percent of adults with a BMI of 25 or more, which is consistent with the CDC findings listed earlier. Figure 1.2 shows the BMI distribution for adults 18 to 64 years of age from the NHIS. The mean BMI found in the NHIS data was 27. 5. It is clear in the distribution that the majority of people are overweight and or obese. The range for a healthy BMI is marked on the histogram and ranges from 18.5 to 25.

Tobacco use is the number one leading preventable cause of death in the US with over 400,000 people dying each year from related diseases (American Lung Association 2008). Diseases that linked to tobacco use include cancer,

cardiovascular disease, and respiratory disease. The CDC estimated that over $75 billion was spent on medical expenditures related to tobacco use in 1998. In addition to that, the CDC estimated that the annual economic burden from lost productivity was over $80 billion between the years of 1995-1999. This adds up to a total economic cost of more than $157 billion per year (CDC 2002).

The question of whether people grasp the importance of these health problems with respect to their own personal health. For example, when it comes to obesity, do people see their weight as a problem? Or do they ignore this risk factor because obesity has become so common. This paper explores the degree to which people are aware of the health factors associated with their health behavior, including exercise habits, smoking status, and BMI.

There may be a gap between people's actual health status and their own perceived health status. It is important to close the gap between the two so that individuals are aware of the health related consequences that result from their behavior and habits. The sooner we understand what is causing people to remain in such unhealthy states, the sooner policymakers can begin to make significant progress to effectively lower the costs of preventable medical expenditures and increase productivity.

1.2 How reliable are health indicators?

There is a growing medical and economic literature on Americans' overweight problem and the resulting consequences. Despite its limitations, self-reported health

status, also known as the general health status (GHS) is the most commonly used health indicator in the empirical literature. Of course, the main concern is that the bias introduced by it is self-reporting. It is far too expensive to have clinical evaluations for each person participating in a nationally representative health survey such as the NHIS with well over 10,000 interviews. Therefore, researchers as a practical matter, often must use the GHS.

The GHS has a 5-point scale. Respondents rate their health as “excellent” “good” “very good” “fair” or “poor”. Such labels are subjective and may differ among people with the same underlying health. In addition, a label of “good” is far too simple for such a complex and multidimensional issue such as health. It has been suggested, therefore, that a standard metric be used when asking the respondents such a subjective question. Possibly providing a checklist of good health qualities with a tallied point system to classify the person in a health status would be beneficial in removing some of the biasness of the health status labels. Another suggestion would be to provide a description of basic health characteristics of a person in each of the 5-health status. It is difficult to know at the present if respondents measure their health relative to the national average, their family, or even their neighbor (Strauss & Thomas 1998). In this study I divide the self-reported health status into two categories of good health (for those who report excellent, very good or good health) and less healthy (for those who report fair or poor health). This should decrease the measurement error between such subject labels as discussed above.

In addition to the GHS, researchers also use activities of daily living (ADL) questions. Respondents report whether they have difficulty in doing daily activities that a healthy person should be able to perform without difficulty and without assistance. These include such activities as bathing, eating, dressing and getting around the house. The drawback to this is that many of the activities are associated with old age. Back and joint problems, as well as breathing and coordination can all be tied to aging. However, in this study only adults between the ages of 18 and 64 are included. This will help correct for any mis-measurements in the ADLs associated with old age.

It should also be noted that there have been criticisms of the BMI as being a standard for healthy weight. Research from Michigan State University and Saginaw Valley State University found that the BMI was not accurate when they studied it on over 400 college students. Many athletes have high BMIs due to large amounts of muscle mass, not fat (MSU 2008). The problem lies in the fact that the same standard is used regardless of the age of the person. However, since the BMI is still used largely today this paper will continue with the implications found widely in other literature. In addition, the mean age of the respondents in this study is 40; therefore, we are not dealing with a sample of mostly athletic college students. In fact, 35 percent of the sample reported not exercising at least once a week. The distribution of the BMI in the sample is illustrated in Figure 1.2. Nevertheless, it is important to realize that BMI is not completely accurate in stating whether someone is overweight or obese, especially if they are athletic and therefore weigh more due to muscle, not fat.

The literature on health and income is extensive and many studies report a positive correlation between the two (Deaton *et al.* 1998). Higher income individuals have the resources to see a health care professional and to stay informed. Many people assume they are in good health unless a doctor tells them otherwise. Therefore, it is reasonable to consider that those individuals with little exposure to health care are more likely to report being in good health (Strauss & Thomas, 1998). Poorer individuals who cannot afford health care may think they are in good health even though statistically they probably are not. At the same time;

> The protective effects of income are substantial; Rogot et al. calculate that people whose family income was more than $50,000 in 1980 have a life expectancy that is about 25 percent longer than people whose family income was less than $5,000 (Deaton 2003).

In this study, I will control for income to hopefully correct for some of the measurement error in the self reported health status for those with little or no access to health care. Likewise, my analysis will show the effect income has on health more clearly.

1.3 Health Behavior Decisions

These initial criticisms are important to point out. The goal of this paper however, is to highlight the influences in the decision-making behind the self-reported health status. I hypothesize that younger individuals do not factor in their health behaviors as much as older people. Also income, education, and gender all are hypothesized to influence self-perceived health. As stated above, a GHS of

"good" to a person whose family income is less than $25,000 might not be considered "good" to a person who has a family income of $75,000 +.

Several studies address the decision making process behind lifestyle choices that affect health. Chou *et al.* (2005) seek to explain the rise in obesity since the 1980s. They find that an increase in restaurants per capita and the increase in the cigarette tax contributed to the increase in BMI over the time period and that policymakers should make the obesity problem high on their list of priorities (Chou *et al*. 2005).

Because taxing fast food would hurt the poor the most, Philipson (2001) suggests that subsidizing gym memberships or giving tax breaks to businesses who offer exercise opportunities, would be a step towards fighting the problem. In fact, since the 1990s many companies have taken the initiative and formed wellness programs with goals of reducing health care costs for individuals by promoting healthy living. There have been significant results in participants of the programs. For example, Union Pacific implemented their own Health Track Program and avoided $53.6 million in health care costs from 1998 to 2001. This was due to changes in lifestyle choices that resulted in a 10 percent decrease in claims related to lifestyle factors. All of this was simply due to changes in one's style of living. The program emphasized healthy eating, exercising, not smoking, etc through education programs and support groups (Union Pacific 2005).

It is assumed that individuals make choices with the knowledge of how those actions will affect their future preferences. Based on the work done by Akerlof (1991) we can use that assumption to understand people's choices in health habits

and behaviors. Akerlof highlights that often, people do intend to change their habits such as smoking or obesity attributed actions because they are in fact aware of the bad consequences associated with them. The reason people continue living unhealthy lifestyles is because of the weight procrastination adds to the cost of changing their lifestyle.

Modern cognitive psychology states that people place too much weight on current events and too little on distant events. For example, the single act of smoking one cigarette gives the person instant gratification. The consequence of smoking, on the other hand, is little in the present. Many of the main consequences from smoking are in the far future, not guaranteed, and still avoidable if the person were to quit smoking. Therefore, the single act of smoking one cigarette does appear to maximize that person's utility. However, in reality people are not maximizing their "true utility" because the series of small choices add up to one large bad choice that results in serious diseases and potentially death, as in this case. Therefore younger individuals are more likely to procrastinate changing unhealthy behaviors than older individuals. They see that they can put off changing such habits for another day.

Akerlof lays out the three key features of an action that results in procrastination. The first feature is that the time in between decision-making is short. Using exercise as an example, choosing each day to not exercise is a short time period and not a well thought out plan of action. Second, the cost of not exercising today as compared to tomorrow is small. Not exercising for one day has a very small cost on a person's health. The last feature is that the decision-making

is time inconsistent. The person making these decisions does not rationally expect that the next day he or she will choose to not exercise again. And so the cycle continues as procrastination of the event happens repeatedly.

The rate of time preference, or discount rate, is another concept in modeling health behavior. It is typically a financial term reserved for discussions of investment and borrowing. However since like money, health is a stock of capital, the term can be applied to one's decisions on the tradeoff between future and present consumption in order to maximize one's own utility. It is assumed that individuals make rational decisions between current consumption and future investment into health (Finke and Huston 2003). Therefore, it is possible to relate health related behaviors to an individual's own discount rate.

Exercising, dieting, knowledge of health, sleep, etc are just a few health factors that require time and input from the consumer. If an individual does not see a benefit in exercising then they simply will not exercise since they will get more utility doing another activity. Likewise, if one does not value healthy eating then he or she will not take the time to learn about eating healthily or about the nutritional information on the food he or she are consumes.

It appears that smokers have a high discount rate for the future. Using smoking as an indicator for time preference, Munasingne and Sicherman (2000) found that indeed smokers had a higher marginal rate of substitution of current earnings for future wages. They receive more pleasure smoking now than they get from potential future utility for living a long and healthy life. Likewise, those with higher education likely have a lower future discount rate since they value future

earnings from a job by having their degree and are willing to forego present loss of earnings and leisure time to go to school and increase their human capital.

Likewise, the immigrants in this paper appear to have low discount rates since they have lower smoking rates. In addition, they have higher educational levels and forgo the present loss of earnings during a moving process. They value moving to a new country in hopes of earning higher wages more than the cost in the present of undertaking the price of moving and temporary unemployment during the transitional period.

Huston and Finke (2003) test the theory that a high future discount rate is associated with a less healthy diet. They hypothesize that those who discount the future in their behaviors unrelated to diet will also reflect the same future discount in their choice of food consumption. This is based on the individuals actions in choosing present utility in partaking in the activity over those that will be stocked for future enjoyment, such as choosing smoking now over a long and healthy life in the future. Huston and Finke show that those who smoked had a lower score for healthy eating. Less education and less exercise, are also used as a proxy for a high discount rate, and are negatively related to healthy eating. Respondents younger than 35 years also had a lower health eating score again suggesting a higher discount rate.

Laibson (1997) characterized hyperbolic discounting to a relatively high future discount rate over short time horizons and a relatively low discount rate over long horizons. This can be used to explain why the younger respondents choose to not eat healthy in the present. Taking the time to read the nutritional label adds extra

costs to consuming that good. Therefore the individual will choose to eat whatever he likes now rather than do the research of the nutrition obtained from the good and eat a healthy meal later after finding a healthy replacement for it. Huston and Finke helped to highlight those who are most at risk to unhealthy eating so that policy makers can target them for nutritional education. Also it helps to explain what factors play a role in an individual's choice in healthy eating.

1.4 Modeling Health Choices

In this section I provide a formal model of health choices following Strauss and Thomas' (1998), health is produced by combining purchased inputs and time, within a social context:

$$(1.1) \qquad H = F(H_i) = F(X_h, T_h; A, B)$$

where *H* is an array of measured health outcomes that are dependent upon a vector of purchased health inputs ***X***, such as health care, and time ***T*** required for the use of those inputs such as going to the doctor and exercising. Both inputs are controlled by the individual and are needed for one's health. Increasing ***X*** such as health care or increasing time spent exercising both increase health, therefore

$$(1.2) \qquad \frac{\partial H}{\partial X_h} > 0 \quad \& \quad \frac{\partial H}{\partial T_h} > 0$$

A and ***B*** represent uncontrollable inputs (at least in the short run) that affect the individual's health. ***A*** denotes the individual's socio-demographic characteristics and ***B*** *is* family background. For example, higher income and more education may result in better health if doctors are more attentive to affluent patients and if more educated patients are better at producing health, perhaps because they combine inputs more efficiently. Ethnicity and race may affect health production if minorities receive worse medical care due to bias or language barriers (Williams 1999).

Also relevant are the health differences across race and ethnic groups. As can be observed in the summary statistics, the distribution of income levels between races is not equal nor is the percentage of individuals that are healthy. Health status varies across all races with African Americans being least healthy. One explanation for this could be the differences in income and therefore a difference in consumption of health commodities. In 1996, African Americans median family income was nearly $20,000 lower than that of whites (Williams 1999). However, even when controlling for income, whites had longer life expectancies across both genders. Another explanation could be differences in health care services due to discrimination.

> The stigma of racial inferiority appears to affect the way that minority group members are treated in the health care system. A large body of evidence indicates that even after adjustment for SES, health insurance, and clinical status, whites are more likely than blacks to receive a broad range of specific medical procedures. (Williams 1999)

If discrimination appears in health care services, we would expect,

$$(1.3) \qquad \frac{\partial H}{\partial X_{h,Whites}} > \frac{\partial H}{\partial X_{h,AfricanAmericans}}$$

Whites then are getting more health from the same increase of health inputs even if they started at the same level of health as an African American.

Utility is a function of health and non-health commodities[1]. My analysis follows Strauss and Thomas (1998), which I modify to include future utility. This allows me to incorporate the discount rate as discussed above. The utility function is

$$(1.4) \qquad U_t = U(Z, H, U_{t+1}; \xi(A, B))$$

where utility at time *t* is dependent on health at time ***t***, $\boldsymbol{H_t}$, all other commodities produced at time ***t***, $\boldsymbol{Z_t}$, and future utility, $\boldsymbol{U_{t+1}}$. Future utility is

$$(1.5) \qquad U_{t+1} = U(Z_{t+1}, H_{t+1}(H_t); r)$$

where health at time ***t+1*** depends on health produced at time *t* . The discount rate, ***r***, affects how a person values their future utility. $\frac{\partial U}{\partial H}$ will be higher for people with a lower discount rate, because producing more health now leads to more health in the future, and people with a low discount rate will value future utility more.

Unobserved tastes and preferences, $\boldsymbol{\xi}$ affect the relative preferences for commodities and health and are influenced by socio-demographic characteristics, ***A***,

[1] See Becker (1965) for the commodity framework

and family background, ***B***. The unobserved characteristics can be used to help explain the health habits that individuals follow that are not consistent with a healthy lifestyle. Family background, especially culture, affects the individual's tastes and preferences and if a person grows up in a place that eats and lives healthy then they are likely to prefer this lifestyle as well. However if they grow up in a place where deep fried foods are common and people are sedentary, then the individual is likely to also adapt to such a taste and preference in that style of living.

The utility function has both a budget and a time constraint with the health production function as a restriction. The time constraint is on the total time available in a day (24 hours). Time at home and time at work are the two choices an individual can make. The budget constraint combines all earned and unearned income and constrains the amount of spending on goods. The full constraint is

$$(1.6) \qquad \sum \Pi_i Z_i = V + w\bar{T} \;;\; \prod_i = p_i x_i + wT_i \;;\; V + w\bar{T} = \sum_i p_i x_i + w\sum T_i$$

V is nonlabor income, ***w*** is the individual's wage, and $\boldsymbol{p_i x_i}$ is simply the spending on all goods purchased. Utility is maximized when the marginal utility of health per dollar equals the marginal utility of the non-health commodity per dollar.

$$(1.7) \qquad \frac{MU_Z}{\prod_Z} = \frac{MU_H}{(x_h p_h + wT_h - T_w \frac{\partial w}{\partial H})}$$

$(x_h p_h + wT_h - T_w \frac{\partial w}{\partial H})$ represents the "shadow price of health". It includes the price of health inputs and the cost of time used for those inputs minus time at work with wages as a function of health. If education and health are complements in the production of human capital, then $\frac{\partial w}{\partial H}$ will be higher for more educated workers, the shadow price of health will be lower, and more educated workers will produce more health. Those with more education may also be more efficient at producing health, and so require fewer inputs. Second, agents with a lower ***r*** will have higher marginal utility of health production today, as mentioned earlier, and so will produce more health.

Consistent with literature and previous empirical work, I expect that education will be positively correlated with health and the self-reported status. Likewise income will have a positive relationship with the individual's health. With a lower shadow price of health one can purchase more health inputs and is also more educated on health consequences of his actions. Those groups starting at lower levels of income then are expected to have a lower prevalence of healthy individuals and increases in income with have a larger positive effect on her health. I expect African Americans then to have a lower probability of reporting good health but have a larger positive effect for the individuals in the higher income groups and levels of educational attainment. Individuals with a high percentage of smokers I expect to have a higher discount rate and therefore will not fully account for their bad health habits on their self-reported health status. Looking at the summary statistics of the different groups analyzed I expect the individuals not born in the United States to

account for their health behaviors to a larger degree than those born in the United States.

1.5 Evaluation of Health Status

The overlying question for this paper asks how people evaluate their health. Incorporating the ideas, models, and literature provided above we can hypothesize the reasons as to why there would be a divide between actual health status and perceived health status in the self-evaluations of individuals. I therefore turn to the problem of modeling perceived health. In a simple formulation,

$$\text{Perceived health} = \alpha * \text{Actual health} + \beta * \text{risk factors} \quad (1.8)$$

α is closer to one when a person has a more accurate view of their health. Ideally if a person had an α equal to one then they will link weight their actual health to their perceived health. The problem is that when α is small, the person is not fully accounting for their health. There could be many reasons for α to be small. I hypothesize that people assess their health status by comparing their own health with a member of a reference group. If the reference group member is unhealthy then they will have a smaller α. As discussed previously if a person is assessing their health relative to that of their peers, and their peers are living unhealthy lifestyle then their view of health is incorrectly assessed. If this is true then you would expect American born respondents to have a larger divergence between actual and

perceived health. The lifestyle here is not the healthiest considering the vast majority of Americans are overweight or obese. Likewise African Americans are expected to experience this same disconnect between actual and perceived health. The mean health characteristics of African Americans are much worse than those of other races. Rating your health to that of your family's when everyone is unhealthy does not give that person an accurate view of their health.

A second possible answer to why there would be a divergence between actual and perceived health could be differences in future discount rates. As discussed previously, if a person has a low discount rate then they are more likely to be healthier since they value their future health. However someone who is more present oriented values their actions today without the consideration of the consequences in the future. By not considering such reactions, the person could have a distorted view of their health. Someone who values the future will take the time to learn and practice a healthy lifestyle. Following this, I would expect that immigrants and older respondents are more likely to have accurate perceptions of their health. Both illustrate their lower discount rate compared to that of the contrasting group in the analyses.

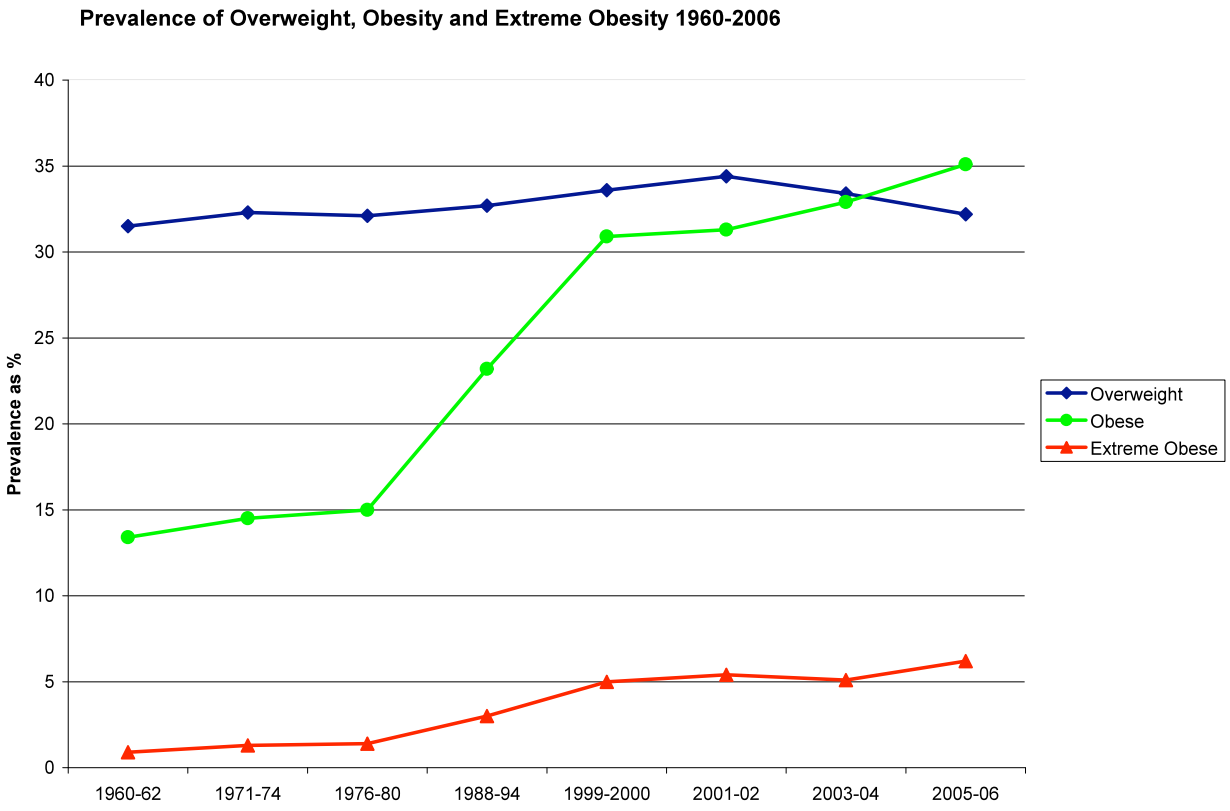
Finally, gender could explain differences in health perceptions. The literature supports the hypothesis that fewer women will report good health even though they are more likely to be healthier and have longer life expectancies than men. Women are more likely to use health services. This is possibly due to them being more sensitive from symptoms than men are. Another suggested explanation is that women still have the self-conscious feeling of being the nurturer in the relationship.

Therefore, when men are sick women take care of them. However when women are sick they have to go to a health care person to relieve their symptoms (Green and Pope 1999). Additionally, gender-related psycho-social and behavioral influences affect the perception of health and consequently affect health care usage. It is hypothesized that women are more likely to take on the "sick role" at home and hence end up using health services more often. For example, Green and Pope (1999) found that women used more sick days than men.

Another reason that women may rate themselves less healthy than men could be due to factors other than actual physical health. Benyamini *et al.* (2000) concluded that the range of women's self reported health status is due to the other factors taken into account by women. Mental illness, depressions, and non-health factors affect a woman's perceived health. With this information, I expect women to have healthier lifestyle choices in health habits and behaviors, but a lower perceived health.

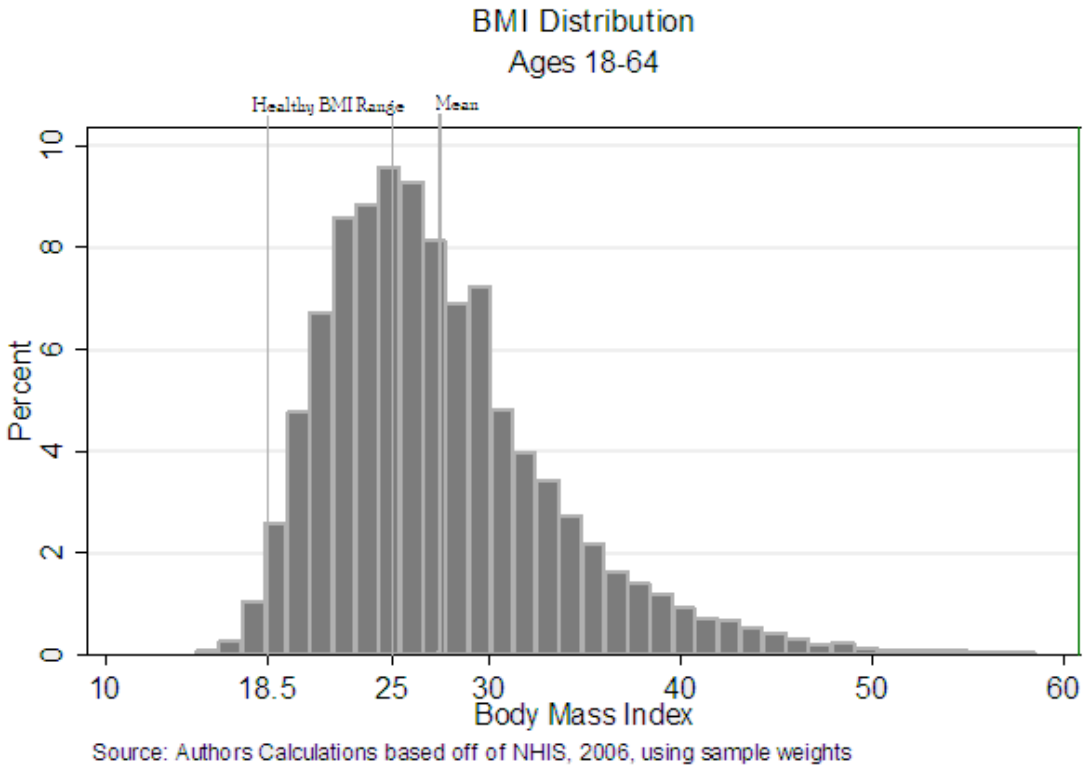
Tables and Figures

Figure 1.1



Note: Figure created by author, using data collected from NCHS
Source: Center for Disease Control and Prevention, National Center for Health Statistics, National Health Examination Survey, and National Health and Nutrition Examination Survey. (CDC, 2008)

Figure 1.2



Source: Authors Calculations based off of NHIS, 2006, using sample weights

Chapter 2 Analysis of the Discount Rates between Generations

2.1 Data and Econometric Model

All the data used for this study was taken from the 2006 National Health Interview Survey (NHIS). The data used was from the Adult, Persons and Family Surveys. The NHIS Survey is sponsored by the National Center for Health Statistics and the Center for Disease Control. The purpose of the survey is to provide information on the amount and distribution of illness and its effects as well as to document the kind of health services that people receive.

The data collection is conducted by the U.S. Census Bureau and includes the data from 33,468 households, 29,204 of whom were interviewed face-to-face, leaving only 4,264 who were not interviewed due to refusal or failure to locate. Of the households interviewed, there were 75,716 persons in 29,868 families. Participants were not required to answer every questions asked. In many cases the person answered “Don’t Know”, “Refused” or “Not Ascertained”. Just over 24,000 people were asked specific questions regarding their health behaviors such as smoking, exercise, and BMI. Any observations where there were missing values for the independent variables chosen for the study were subsequently dropped. As a result, the sample set used in this study uses information from 14,753 persons. The people in this sample included all those who answered all the pertinent health behavior questions and health measure questions used in this study. Additionally, only those between the ages of 18 and 64 were included. African Americans,

Hispanics and Asians were all over sampled to give a more precise estimate of health characteristics in minorities. The NHIS provides final weights both for the post-stratification adjustments (sex, age, race/ethnicity) and for Interim Annual Weight that were without the post-stratification adjustments. Clustering of dwelling units was done to cut back on costs and was done within counties, adjacent counties or metropolitan areas. I used the final weights for stratification.

According to the CDC, a healthy BMI weight class ranges from 18.5 to 25. I grouped the sample according to the standard CDC weight class categories: underweight, defined as a BMI greater than or equal to 18.5, healthy, defined as a BMI between 18.5 and 25, overweight, defined as a BMI greater than or equal to 25, obese has a BMI of greater than or 30, and extreme obesity also known as morbid obese is defined as a BMI of greater than or equal to 40. The BMI uses self-reported height and weight. Therefore, the BMI in this sample might be biased downward due to the tendency of people to underreport weight and/or over report their height (Flegal et al., 2002).

I consider those reporting a SRHS of 1-3 (excellent, very good, or good) to consider themselves to be in good health and a report of 4-5 (fair or poor) as considering themselves to be less healthy. Of the sample populations, 5 percent of people ages 18-34 and 15 percent of those ages 35-64 reported being less healthy. As a result, the self reported health status was reduced to a dummy variable of either 1 for good health for those that reported a status of good or better and 0 for those less healthy which was a status of fair or poor.

I also studied use a potentially less biased measure of the individual's health. This was found using certain questions in the survey about tasks one had to do and the difficulty it took to perform them. These tasks are some of the basic activities of daily living (ADLs) that health professions use to detect the health status of individuals. The inability to perform these tasks without help from others is a practical method of detecting health problems. There were 25 questions asked including such questions as how difficult it was to walk up 10 steps without resting, to walk a fourth of a mile, to eat, to dress, and to stand for two hours without special equipment.

The ADL variable came from a recode that the NHIS provided. One of the variables was a 0-1 measure of requiring assistance with activities of daily living or personal care. The other measured instrumental activities or routine needs of daily living which included such activities as shopping and household chores. I assigned a value of one if no difficulty or assistance was needed in performing both ADLs and a zero if assistance or difficulty occurred in performing either measure. Of the sample population, 97 percent reported no difficulty doing either ADL measure. This is consistent with the CDC's report of the 2006 data. The report stated that 2 percent of the population needed assistance doing ADLs such as eating, etc and 4 percent of the population needed assistance doing instrumental activities of daily living (CDC, 2006).

Table 1.1 provides the percentage of persons that reported a healthy status for different demographic, income and education groups. Most interesting was the difference in the self reported health status between BMI categories for those in the

same age group. Final weights as provided by NHIS were used for the summary statistics.

I hypothesized that younger respondents would discount the future more than older respondents in relating their BMI to health. Table 1.1 shows that among the youngest age group there is little difference in reported health status between those with healthy and those with unhealthy BMIs. The one exception is found among those who are morbidly obese, who are less likely to self-report a health status. On the other hand, older obese and underweight people were less likely to report good health. This supports the hypothesis that younger individuals do not link their health to their BMI. In the age group of those 25 to 34, there was a 4-percentage point difference in those that reported good health between the BMI categories of healthy and obese. In contrast, comparing the same BMI categories in age group 55 to 64 there was a 10-percentage point difference in those that reported good health.

In addition to the age group variance of self reported health status, it is important to take notice of the change in the percentage of those reporting good health by education and income within the same BMI category. The positive relationship between health and income as well as education and income is illustrated in the health status of those surveyed. Also of note is the drop in those reporting good health between the income groups of $0-24999 and $25,000-44,999. This could be due to those in the higher income group of the two being exposed to health care. As stated previously, often times people assume that they are in good health until there is information that supports the contrary (Strauss & Thomas, 1998).

Table 1.2 presents the summary statistics for the variables used in this analysis by age group. The first age group was for adults between the ages of 18 and 34. The second group includes only adults 35 to 64 years old. There is a slight divergence between those that reported being in good health and those that were given a status of good health based on their difficulty to perform the ADL activities. Of those less than 35 years old, 94.6 percent reported being in good health. The ADL indicator of good health shows 99 percent are healthy. The older age group has a similar occurrence where the self reported health status shows a lower percentage of individuals who think they are healthy than the ADL indicates. In that age group, 85.1 percent reported good health but the ADL indicator shows 96.3 percent of the older generations are in good health as decided by the ADL standards. If the ADL is an unbiased indicator of health then both generations are underreporting their good health and exaggerating their poor health. Perhaps there are other contributors to the self reported health status that are not covered by the ADLs. For example, those with diseases that do not affect ADLs would be among those reporting less healthy but no difficulty in performing ADLs. They would not be delusional then but merely accounting for another health aspect not covered by the ADLs. This idea should be researched further to understand why such a large percentage of individuals are reporting poorer health than what the ADL reports as being healthy. The idea that individuals consider other aspects of their health besides strictly physical capabilities could explain part of the gap between the two indicators.

Reporting a status of good health depends upon a variety of determinants. As mentioned previously, the aim of this paper is to test how important certain health behaviors and habits are to the individual's self reported health status. This assumption can then be written to determine the probability of a person reporting a health status of "good health". I used a probit model to assess the effect of health-related behaviors on self-reported health. Data analysis was performed using STATA. Each individual had the option of reporting good health or less healthy, which resulted in a discrete economic variable *y* as the outcome,

$$Y_i = \begin{cases} 1 \text{ if individual reports good health} \\ 0 \text{ if individual reports less healthy} \end{cases}$$

The goal is to understand and explain how the individual made this choice. By using the probit model the choice of health status is then turned into a probability based on the explanatory variables.

(2.1) $Y_i = f$ (age, gender, education, income, BMI, sleep hours, smoker status, exercise routine)

where perceived health is a function of these explanatory variables. The independent variables including some demographic variables, such as years of school, income group, age and an indicator variable that takes the value of one for women and zero for men. Also used was smoking variable where smoking everyday or some days were indicated with a value of one and a value of zero were taken by

those who do not report smoking. Exercising at least once a week (1=yes) was another indicator variable used, those that did not report exercising at least once a week received a value of zero. Hours of sleep and BMI were the remaining independent variables that accounted for their behavioral health status.

The more health inputs an individual puts into having a healthy living by following healthy habits, the more likely they are to report a status of good health. For example if a person does not smoke then he/she should be more likely to report good health. Not smoking should increase the person's health outcome for a healthy status and therefore increase the probability that they will have a status of good health. The probit model represents this probability of P,

$$P_i = F(H_i) = F(\beta_1 + \beta_2 X_{i2} + ... + \beta_k X_{ik}) = F(X'\beta) \tag{2.2}$$

where ***X*** is a vector of characteristics of the respondent and ***H*** is individual i's perceived health. The parameters ***β*** relate the changes in the explanatory variables ***X*** to the changes in the probability of not having good health. The data was analyzed using the dprobit model which reports the marginal change in the probability of good health for an infinitesimal change in a continuous variable or a discrete change in the probability of good health for the independent variables that are categorical variables. This can be expressed as,

$$\frac{\partial P_i}{\partial X_{ik}} = \frac{\partial F(X_i'\beta)}{\partial X_{ik}} = F'(X_i'\beta)\frac{\partial (X_i'\beta)}{\partial X_{ik}'} = f(X_i'\beta)\beta_k \tag{2.3}$$

The magnitude of the change in the probability given a change in a variable for an individual is illustrated by $\boldsymbol{\beta}$ and the magnitude of $f(X_i'\beta)$. Educational attainment and income level were the two variables reduced to categorical variables. Using the xi function in STATA the two were expanded to an indicator and interaction variables, where the dummy variable with the lowest value is dropped. The lowest value is indicated in the tables as omitted.

2.2 Results

Table 2.3 shows the results from the first model (Model I) and suggests that the older cohort puts a larger emphasis on their BMI than younger cohorts in assessing health. This could be due to older individuals accounting for BMI levels to a higher degree than younger individuals, or that they have begun to feel the side effects associated with obesity. The largest difference between the age groups appears between the smoking and exercising. The older cohort was nearly three times more likely to report bad health if they smoked than younger people. As expected there was a positive relationship between good health and exercising and negative one for smoking. Older generations that exercised were over eight times more likely to report good health than the younger generations. And as expected, as the BMI increased, the probability of reporting a status of healthy decreased. All other variables held constant, for the younger generations, one standard deviation increase in BMI from the mean resulted in a 2.1 percent decrease in the probability of reporting good healthy. For the older generations, there was a 3.5 percent

decrease.

The second regression (Model II) uses ADL status as the dependent variable. Table 2.4 reports the results. The difference between the age groups was smaller here, suggesting that age group plays a smaller role in actual, as opposed to perceived, health. A change in the behavioral health measures did not have a large impact on health status based on ADLs. However under this model with the ADL indicator, the BMI variable suggests that there will only be a 1.3 percent increase in the probability of needing assistance to perform ADLs. This suggests that changes in the behavioral health measures did not affect the individual's ability to perform the ADLs without assistance or difficulty. I find it highly unlikely that if an individual goes from having a BMI of 28.1 to a BMI of 40.1, that their health will not be significantly affected. The effects are much smaller than those in the first model. Since the ADL is a separate indicator from the self-reported variables perhaps the relationship is not as strong since it is not directly influenced by the self reported behaviors and health of the respondent. The ADL variable comes from a set of questions where the respondent simply answered yes or no to difficulty in each activity. Some of the health habits do not immediately affect the respondent and therefore are not covered by the ADLs.

In the last model, I include ADL to control actual (as opposed to perceived) health for the self reported health status as the dependent variable. Table 2.5 reports the results. Again, older respondents that smoked were nearly three times more likely to report bad health than the younger generations that smoked. Also, exercising appeared to have a bigger impact on the probability of reporting good

health. Older people were over 10 times more likely to report a good health status than the younger generations if they exercised at least once a week. The relationship between education and income and health is clear in table 2.5. The higher the education level, the more likely one was to report good health. Even after controlling for the more objective indicator of health (ADL) the results were extremely similar to the first model. This suggests that the gap between the individual's perceived health and actual health does not lie within the range of the physical capabilities that ADLs account for. It is possible then that the self-reported health status captures other qualities of health that are not strictly physical and therefore are not included in the ADLs.

2.3 Conclusion

The BMI had quite a low impact on the probability of perceiving poor health, despite the fact that it is the number two leading killer for preventable diseases. I think that this illustrates the importance of getting more information out to the public and figuring out a way to emphasize the importance of being healthy so that it can be retained. This paper showed that smoking and exercising did have a significant impact on the individuals' health status but there was quite a difference between the two generations. Perhaps there are other variables that contribute to the self reported health status that can be of more help to explain the self reported health status of individuals and the resulting perceived health status. Older people do account for certain healthy lifestyle choices when assessing health status. What

needs to be worked on now is getting younger generations to understand the importance of choosing a healthy lifestyle and the impact that their choices make on their current and future health status.

Tables and Figures

Table 2.1. Percentage of Individuals Reporting a Healthy Status, by demographics

	Groups	All BMIs	Underweight BMI≤18.5	Healthy BMI 18.5-25	Overweight BMI≥25 & <30	Obese BMI≥30 & <40	Extreme Obesity BMI≥40
Sex	Male	89.7	86.5	91.7	91.5	85.0	77.2
	Female	87.8	90.5	92.8	88.1	82.8	66.7
Age	<25 years old	95.3	98.4	96.4	95.6	91.8	83.0
	25-34	94.5	91.8	96.0	95.8	92.0	76.3
	35-54	87.5	85.5	90.9	89.7	83.5	69.2
	55-64	78.4	71.4	84.2	80.1	74.0	59.4
Income	$0-24999	82.3	88.0	89.1	80.3	73.0	56.0
	$25000-44999	68.6	82.4	80.7	69.7	58.8	35.8
	$45000-74999	73.8	76.2	81.6	74.1	67.3	52.2
	$75000+	82.2	76.9	86.4	85.3	74.3	65.9
Education	No HS Diploma	77.2	76.3	83.6	79.5	70.6	51.2
	High School Diploma	88.0	88.7	91.2	90.2	84.0	71.7
	Associate Degree/Some	90.8	95.8	93.0	92.4	89.7	68.7
	Bachelor's Degree	95.1	97.4	97.9	94.9	89.6	86.9
	Graduate Degree	96.8	93.9	97.3	97.6	95.3	87.9
	Observations	14753	231	5464	5046	3359	653

Source: Author's Calculations based off of NHIS data, 2006

Table 2.2 Summary Statistics, by age group
(Standard Errors in Parenthesis)

	Age<35	Age≥35
	Mean	Mean
Behavioral Health Measures		
Good Health (%)	94.7	85.2
ADL performance (%)	99.0	96.4
Exercises 1 or more times per week (%)	67.2	64.4
Smokes Everyday/Somedays (%)	23.7	23.7
BMI	26.4	28.1
	(5.9)	(6.0)
Sleep Hours	7.2	7.0
	(1.3)	(1.3)
Demographic		
Age	26.4	48.2
	(4.8)	(8.3)
Female	0.54	0.53
	(0.50)	(0.50)
Educational Attainment (< High School Diploma=Omitted)		
High School Diploma	0.51	0.45
	(0.50)	(0.50)
Associate Degree/ Some College	0.10	0.11
	(0.29)	(0.32)
Bachelor's	0.18	0.18
	(0.38)	(0.38)
Graduate Degree	0.06	0.10
	(0.23)	(0.30)
Income Level (<$25,000=Omitted)		
25000-44999	0.30	0.21
	(0.40)	(0.41)
45000-74999	0.20	0.24
	(0.40)	(0.43)
75000+	0.20	0.30
	(0.40)	(0.46)
Observations	5427	9312

Source: Author's calculations based off of NHIS, 2006

Table 2.3. Effects of Behavioral Variables on Self Reported Health Status. (Standard Errors in Parenthesis)

	Age< 35		Age≥35	
	dF/dx		dF/dx	
Behavioral Health Measures				
BMI	-.003	**	-.005	**
	(.000)		(.000)	
Sleep	.002		.004	
	(.002)		(.002)	
Smoker (Yes=1)	-.018	**	-.055	**
	(.007)		(.009)	
Exercises (at least once per week=1)	.007		.063	**
	(.006)		(.007)	
Demographics				
Female	-.014	*	-.009	
	(.005)		(.006)	
Age	-.001		-.005	**
	(.001)		(.000)	
Educational Attainment (< High School Diploma=Omitted)				
High School Diploma	.023	**	.042	**
	(.006)		(.008)	
Associate Degree/Some College	.028	**	.044	**
	(.005)		(.009)	
Bachelor's Degree	.042	**	.058	**
	(.005)		(.009)	
Graduate Degree	.027		.081	**
	(.007)		(.009)	
Income Level (<$25,000=Omitted)				
$25,000-44,999	.013		.068	**
	(.005)		(.006)	
$45,000-74,999	.022	**	.095	**
	(.006)		(.006)	
$75,000 +	.035	**	.140	**
	(.005)		(.007)	
Pseudo- R^2	.10		.18	
Pro>X^2	(.000)		(.000)	
Intercept[‡]	2.419	**	2.352	**
	(.274)		(.164)	
Observations	5427		9326	

Source: Author's calculations from NHIS, 2006

Note: Dependent Variable is Health Status (1=good health, 0=less

** denotes significant at a 5% level, * denotes significant at a 10% level

[‡] constant taken from Probit Model

Table 2.4 The Effects of Behavioral Variables on Activities of Daily Living (ADLs) (Standard Errors in Parenthesis)

	Age< 35		Age≥35
	dF/dx		dF/dx
Behavioral Health Measures			
BMI	-.0002		-.001 **
	(.000)		(.000)
Sleep	-.002 **		-.002
	(.001)		(.001)
Smoker (Yes=1)	-.001		-.006
	(.002)		(.003)
Exercises (at least once per week=1)	.007 **		.022 **
	(.003)		(.003)
Demographics			
Female	-.003		-.005
	(.002)		(.003)
Age	-.0001		-.001 **
	(.000)		(.000)
Educational Attainment (< High School Diploma=Omitted)			
High School Diploma	.002		.001
	(.002)		(.003)
Associate Degree/Some College	.002		.002
	(.003)		(.005)
Bachelor's Degree	.004		-.002
	(.003)		(.005)
Graduate Degree	-.0002		-.001
	(.006)		(.007)
Income Level (<$25,000=Omitted)			
$25000-44999	.002		.021 **
	(.002)		(.002)
$45000-74999	.002		.025 **
	(.002)		(.002)
$75000+	.008		.032 **
	(.002)		(.003)
Pseudo- R^2	.08		.17
Pro>X^2	.00		.00
Intercept[‡]	2.976 **		3.417 **
	(.482)		(.242)
Observations	5427		9326

Source: Author's calculations from NHIS, 2006

Note: Dependent Variable is ADL (1=no difficulty, 0=difficulty)

** denotes significant at a 5% level, * denotes significant at a 10% level

[‡] constant taken from Probit Model

Table 2.5 Effects of Behavioral Variables on Self Reported Health Status, controlling for ADLs. (Standard Errors in Parenthesis)

	Age< 35		Age≥35	
	dF/dx		dF/dx	
Behavioral Health Measures				
No difficulty performing ADLs	.376	**	.467	**
	(.068)		(.032)	
BMI	-.003	**	-.005	**
	(.000)		(.000)	
Sleep	.003		.006	**
	(.002)		(.002)	
Smoker (Yes=1)	-.017	**	-.053	**
	(.006)		(.009)	
Exercises (at least once per week=1)	.004		.051	**
	(.005)		(.007)	
Demographics				
Female	-.012		-.006	
	(.005)		(.006)	
Age	-.001		-.004	**
	(.001)		(.000)	
Educational Attainment (< High School Diploma=Omitted)				
High School Diploma	.022	**	.044	**
	(.006)		(.008)	
Associate Degree/Some College	.026	**	.045	**
	(.005)		(.009)	
Bachelor's Degree	.041	**	.062	**
	(.005)		(.009)	
Graduate Degree	.027	*	.083	**
	(.006)		(.008)	
Income Level (<$25,000=Omitted)				
25000-44999	.013		.054	**
	(.005)		(.007)	
45000-74999	.020	**	.082	**
	(.005)		(.006)	
75000+	.031	**	.127	**
	(.005)		(.007)	
Pseudo- R^2	.13		.23	
Pro>X^2	(.000)		(.000)	
Intercept‡	.820		.722	**
	(.330)		(.191)	
Observations	5427		9326	

Source: Author's calculations from NHIS, 2006

Note: Dependent Variable is Health Status (1=good health, 0=less healthy)

** denotes significant at a 5% level, * denotes significant at a

‡ constant taken from Probit Model

Chapter 3 Variations in health by other characteristics

In addition to age, it is likely that gender, ethnicity and upbringing all have an influence on perceived health, as well as on more objective measures of health status. Culture and values affect eating, exercising, and smoking habits, which in turn affect one's health. This chapter explores differences by immigration status, race and ethnicity, and gender in perceived health status and the relationship between health perceptions and actual health status. This chapter also seeks to explain differences between groups in the gap between perceived and actual health status, and in the effect of education and income on perceived health.

3.1 Effects of Gender, Race and Birthplace

Auld and Powell (2005) ask why BMI levels differ in Canada and the United States. They found that socio-demographic characteristics could not explain why Americans had higher BMIs than Canadians with similar characteristics. Auld and Powell concluded that income, race, educational attainment, and living arrangements only accounted for 9 percent of the variation in BMI levels across individuals. Furthermore it explained almost nothing in the difference in BMIs between Canada and the United States. Therefore the determinants of obesity remained in the residual.

This suggests that the variation in BMI has to do with healthy eating, exercising, and other habits that form when growing up in the respective country. As

pointed out in the paper, energy density and caloric intake data would be useful in explaining the variation of BMIs between the two countries. Preliminary hypotheses are that Americans eat more, exercise less and overall live less healthily than in our neighboring country of Canada. Canada still has an obesity problem though, much like the rest of the world. However the United States is still ranked highest in obesity rates (WHO 2005). So if higher levels of BMIs can not be explained by income, education, gender, age, etc then it must be a behavioral health problem. This conclusion can be made because socio-economic status does not account for the differences in obesity rates therefore the only other explanation is found in the residual which picks up what the explanatory variables did not.

Another study that attempted to explain BMI levels in the United States was Antecol and Bedard's (2005) study on the "unhealthy immigrant effect". Using data from the NHIS the authors documented the tendency for immigrants to converge to American health status levels. They found that immigrants had lower BMIs when they reached the United States than native born men and women but over time they converged to the similar BMIs. This was a result of immigrants converging to the "American Way". Antecol and Bedard use this term as a way to describe the eating and exercise habits and consequential weight gain as evidence of immigrants' assimilation to the way Americans tend to live. Their conclusion was that by looking at immigrants and how they converge to Americans BMI we can try to understand the cause of the weight problem here and what habits and behaviors immigrants change to result in the convergence.

Understanding the difference in health habits is important but it is also important to understand the thinking behind it. Yancey *et al.* (2006) sought to understand the difference in a person's self-perception and actual status surrounding obesity. They found that women were more likely to perceive themselves as overweight than men, despite their actual weight classification. Nearly one fourth of average weight women reported that they considered themselves overweight and just a little over 5 percent of average weight men reported being overweight. On the other hand, men also underreported their overweight status, which is of more concern since this affects the man's perception of his health status. Just 44.5 percent of men that were overweight but not obese said that they considered themselves overweight. That clearly demonstrates a lack of information or a distorted perception of one's own weight, especially since 63.6 percent of men and 45.8 percent of women were overweight or obese. Women had a more realistic view of their weight status with 73.2 percent correctly reporting being overweight.

Yancey *et al.* also reported that whites were most likely to report being overweight while African Americans were least likely, even though African Americans clearly had much higher overweight or obese rates, with rates 13 and 28 percentage points higher for African American men and women, respectively, compared with their white counterparts. Yancey *et al.* concluded that those that did not exercise and were classified as sedentary were more likely to perceive themselves as overweight, regardless of weight. This suggests that it is more of a feeling rather then an actual weight status. Once again this suggests that the

disjunction between actual and perceived health status stems from a person's views on the categories of overweight and obese levels which is a result of the health habits and behaviors (i.e. as in this case, exercise).

3.2 Data and Model

As in the previous chapter, I used the National Health Interview Survey (NHIS). After adding the variables of race and ethnicity and years in the United States, I omitted the 38 observations that did not include these variables. I constructed the following race and ethnicity categories: White non-Hispanic, Hispanic, and African Americans, and Asian. These four categories comprised of more than 99 percent of the observations. I dropped "other race" observations, which included American Indian, Alaska Native, and other non-Hispanic races. The final sample includes 14,600 observations.

The second variable added to the data set was years in the United States for respondents who had immigrated to the United States. The NHIS provided the following responses: less than 1 year, 1-4, 5-9, 10-14, and 15+ years in the United States. I used these responses and immigration status to create three categories: less than 10 years, 10 years or more, and born in the United States.

3.3 Characteristics Studied

I begin with immigrants and those born in the United States. Table 3.1 indicates that health habits and behaviors worsen the longer the individual lived in the United States. Mean BMI and prevalence of smoking increased while self reported good health and performance of ADLs with no difficulty decreased. The only positive effect on health observed was that those that lived in the United States longer reported a higher prevalence of exercising at least once per week.

I found smoking status most interesting as an observed characteristic of living in the United States longer or being born here. The United States has low rates of smoking compared to other OECD countries; in 2005 it was 28th out of 30 countries ranked high to low by the proportion of smokers.[2] Figure 3.1 illustrates the percentage of smokers by region of origin and the percentage of the United States population that each geographical region represents. The geographical regions used were constructed by the NHIS. United States born respondents represent 81 percent of the population, and 26 percent of this group reported smoking. The largest immigrant group emanates from Mexico, Central America, and the Caribbean Islands. They represent 11 percent of the population and of those only 14 percent were reported smokers.

If fact of all the respondents, those born in the United States had the highest percentage of smokers, which is inconsistent with data suggesting the United States has a lower percentage of smokers than other countries. Initially this appears contradictory; however, those that migrate to the United States do not represent the average person from their country or region. Figure 3.1 also includes smoking rates

[2] National Master provides a dataset for country comparisons through compilations of data from the UN, OECD, CIA World Factbook and other such sources. http://www.nationmaster.com/index.php

by world region, based on World Health Organization data. I used the population-weighted average smoking rate for each of the regions defined in the NHIS[3]. As can clearly be seen in the figure, for nearly all of the regions, those that migrated to the United States had a lower average smoking rate than those still living in region the they left. Figure 3.2 shows that most immigrant groups are more educated than non-immigrant Americans. The clear exception is for immigrants from Mexico, Central America, Caribbean Islands, and South America. In addition, the majority of the regions illustrate that the mean household income level of immigrants was higher than that of the United States born respondent. Immigrants to the United States in this sample do not represent the average person in the United States or from their birthplace.

It is important to note these characteristics of the immigrants since the analysis of health is hypothesized to be dependent on the upbringing of the respondent. Therefore, this will influence not only their starting habits but also how those habits affect their perception and actual health. This will be explored in greater detail through the statistical analysis later in this chapter.

The summary statistics for race in Table 3.2 help to illustrate initial differences in the mean health characteristics. All races had a mean BMI in the overweight range except for Asians, who had a mean BMI in the healthy range of 24. African Americans had the highest mean BMI of 29.1, nearing a mean BMI that is obese. With such a wide range of BMIs between races, it suggests that race and ethnicity may influence a person's food consumption and exercise habits. Also important to

[3] Those countries in the region that did not provide the data from the WHO were omitted but still included in the NHIS data. The regions and the countries included can be seen in the appendix of this chapter.

note is the reported smoking status of each race. Asians reported that 14 percent smoked everyday or some days. White, non-Hispanics had the highest reported smoking rate with 26.1 percent reporting smoking. Hispanics reported 17.1 percent smokers while African Americans had a 24.9 percent smoking rate.

As expected looking at the selected health behaviors, Asian had the highest percent reporting good health and no difficulty performing ADLs at 94.0 percent and 99.2 percent respectively. White, non Hispanics were second with 90.2 percent reporting being in good health and 97.0 percent reporting no difficulty in ADLs. African Americans also had a 97.0 percent reporting of no difficulty performing ADLs however only 83.9 percent reporting being in good health. This suggests that there are other health factors other than ADLs are taken into account when self-reporting one's health, other than the simple tasks of ADLs. Ninety-eight percent of Hispanics reported no difficulty in ADLs however 86.3 percent reported good health. This further suggests that there are other contributors to a person's self reported health status other than their performance of ADLs.

Table 3.3 shows that men and women have similar health and socio-economic characteristics. The main difference is that 26.4 percent of men reported smoking, compared with 21.3 percent of women. BMIs were extremely close as well as exercise habits. However, men were more likely to report good health then women. After running a proportion test in STATA, the results showed that the proportions were significantly different. This suggests that men and women may use different criteria in forming health status perceptions as Yancy *et al.* also found. Looking at the ADLs, there was less than a one percentage point difference between

men and women that reported no difficulty in performing the ADLs. The question arises then why fewer women are reporting good health than men are, despite the fact that if anything, looking at the summary statistics women should be healthier.

3.4 Results

Table 3.4 reports the results for the categories of years in the United States and was controlled for age by sorting the respondents into the two previously used age groups. This was necessary to balance the age difference between the immigrants that had lived in the United States for less than 10 years compared to those who have lived here for more than 10 years. The majority of those that had lived in the United States for less than 10 years were younger and healthier than the older age groups. The most striking result is the effect ADLs have on self reported health status. In the younger age group, ADL status was highly correlated with self-reported health for immigrants: reporting no difficulty performing ADLS was associated with an 83 percent and 71 percent rise in the probability of reporting good health, for those with fewer and more years in the United States, respectively. By contrast, reporting no difficulty performing ADLs was associated with only a 31 percent increase in the probability of reporting good health for non-immigrants. Those born in the United States clearly weight ADLs less than immigrants do.

It appears as though immigrants rely on activities of daily living as a meter for how healthy they are. If they need help performing daily tasks then their health is assumed fair or poor, or they at least have a higher probability of self-reporting one

of those measures. However, respondents born in the United States that reported no difficulty in ADLs only account for a portion of individuals with a self-reported good health status. In fact, 28 percent of the United States born sample reported good health even after they reported having difficulty performing ADLs. On the other hand, of the non-United States born respondents, only 15 percent (or 6 out of the 40) reported difficulty in ADL performance and still reported having good health. Even more peculiar is that out of the 28 percent of United States born respondents reporting good health and difficulty in ADL performance was that they had a mean BMI of 30, which is classified as overweight and 28 percent of them were smokers. It appears that immigrants and non-immigrants use vastly different criteria in ranking their health. Another observation from table 3.4 is the effect education attainment has on those less than 35 who have been in the United States for less than ten years. As observed for the United States born group, as educational attainment increases, the probability of having good health increases, which is consistent with theory. However those who have been in the United States for less than ten years do not have any real change in the probability of having good health as education increases. This suggests that education has no real effect on the immigrants' health. The income level for United States born respondents behaved as expected with income positively affecting health. The results that were statistically significant for immigrants also had a positive relationship between health and income.

I next consider differences by race and ethnicity. Table 3.5 reports the results. The most striking difference to me is found in the smoking measure across the races. White and African Americans had the two highest percentages of

smokers and yet among all racial and ethnic groups smoking accounted for the largest decline in self-reported health among Hispanics. Smoking had the lowest effect on health for Asians, however only 14 percent reported smoking. I think the White and African American lack of accountability for smoking on their health is of more concern since it affects a larger group of individuals. Either way it is important for all of the individuals to understand the impact of smoking on their health.

Another interesting finding in Table 3.5 is the effect that the demographics had on the self-reported health status. As expected, age had a negative relationship with health across all races. Female decreased the probability of having good health by eight to nine percent in Hispanics and African Americans, respectively. There was hardly any effect on health in the white and Asian races in comparison. It would be interesting to explore the reason why Hispanic and African American women report worse health.

Educational attainment had the biggest impact on the health of African Americans. An African American who has a bachelor's degree increased their probability of having good health by 7.5 percent. For White, non-Hispanics the degree increased their probability by only 4.8 percent. For all racial and ethnic groups, there was a positive relationship between health and education, as is consistent with literature. The race with the smallest effect from increased education was Asian. However thus far it has been shown that on average they are generally healthy as far as any of the behavioral health measures have shown. It leads to the implication that they are healthy regardless of other aspects since they practice

healthy behaviors and habits on the average and are also have a high mean level of education.

Results for income levels are similar to those for educational attainment. Consistent with the literature, a positive relationship is observed between income and health. The effect was largest for Hispanics and African Americans. Compared to a household income of less than $25,000, Hispanics making over $75,000 had a 10 percent increased likelihood of having good health. African Americans increased their probability of reporting good health by nearly 12 percent. Asians had small and statistically insignificant results in all income levels, as was similar to the findings in educational attainment. This could be linked to the fact that Asians had a high mean income as compared to Hispanics and African Americans who both had relatively low income levels.

The final analysis is provided in Table 3.6 for genders differences. ADLs were more closely associated with reported health for women than for men. Respondents who reported no difficult performing ADLs increased their probability of reporting good health by 50 percent for women and 38 percent for men. All the other behavioral health measures were remarkably similar. Educational attainment increased the probability of having good health more in women than in men. Income levels were similar across both genders except for the first level analyzed of a household income $25,000-44999. Women were nearly 50 percent more likely to report good health than men in the same household income level. This could be due to the number of single mothers living in poverty since the comparison is made to that of household incomes less than $25,000.

3.5 Summary

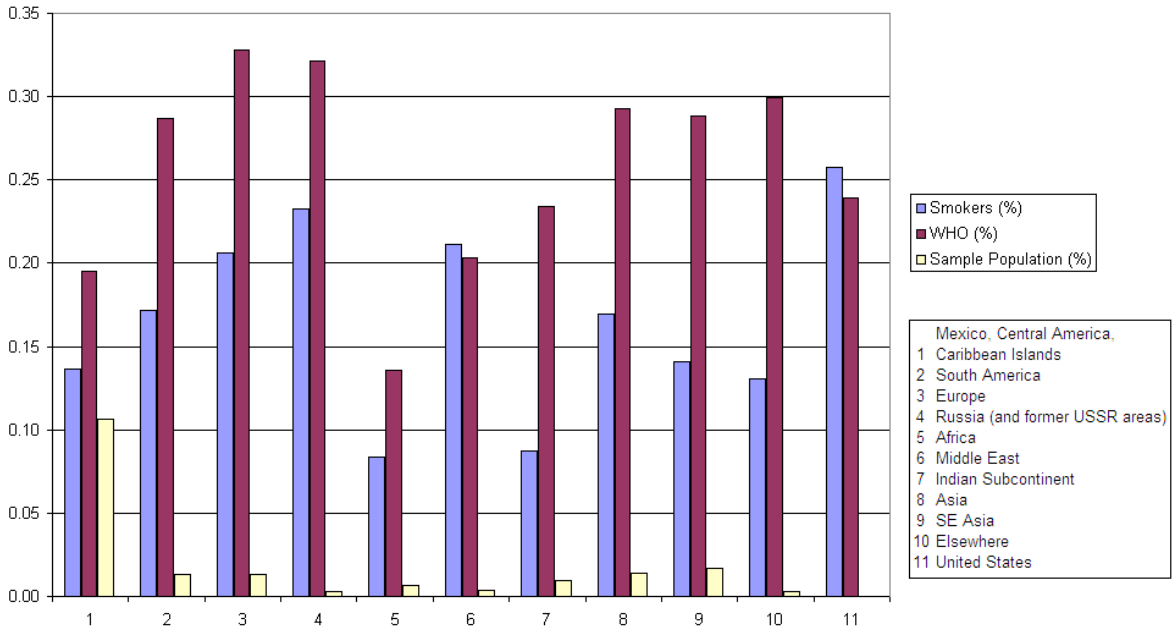
It is clear in the results that there is a difference in perception of health across the different groups of people analyzed. Those not born in the United States appear to take into consideration the ADLs more than those born here. Education had a larger effect on the self reported health status of those born in the United States than those not born here. In the race categories analyzed, Asians were the healthiest. African Americans were the least healthy and have the most to work on in changing the way they perceive their health and their actual health. Having a mean BMI that is nearly obese is not a good sign for African Americans and should be concentrated on in policy analysis.

Gender differences in perceived health were small however significant in understanding the psychology behind the results. Although the summary statistics suggest that women are healthier than men, the self reported health status shows the opposite. This could be due to a few reasons that were highlighted in the literature. One is that since women are more likely to use health services and have a longer life expectancy, that the data suggesting women are health based on the health factors analyzed is correct. However the reason fewer women report good health could be due to the psychosocial factors described previously. The attitude and behavior differences between genders should be taken into consideration when assessing the health. Those that are mentally depressed are more likely to be pessimistic about their health despite evidence to the contrary (Green and Pope

1999). Future research should examine the reason behind this and adjust accordingly if looking strictly at actual health.

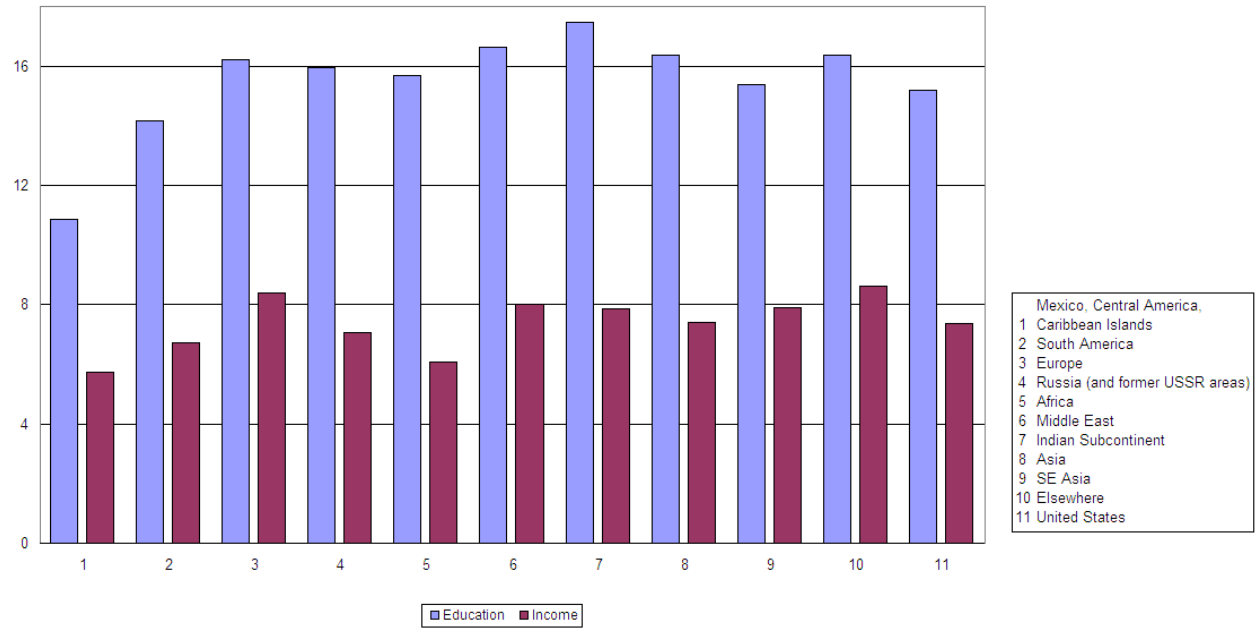
Tables and Figures

Figure 3.1 Percentage of Reported Smokers by Region: Smokers in the United States from the Region versus the Smoking Prevalence Rate of Region of Origin



Note: Authors calculations for WHO based on regions created by NHIS
Source: NHIS 2006 data and WHO country data for 2005 and 2006

Figure 3.2 Years of Education and Household Income Levels by Region of Birth



Source: NHIS 2006 data

Table 3.1.Summary Statistics, by age group (Standard Errors in Parenthesis)

	Age < 35			Age ≥ 35		
	< 10 years	10 + years	Born in US	< 10 years	10 + years	Born in US
Behavioral Health Measures						
Good Health (%)	95.4	95	94.4	92.4	83.5	85.1
ADL performance (%)	99.3	99.0	98.9	99.0	97.9	96.0
Exercises 1 or more times per week(%)	52.2	54.2	71.0	46.2	52.9	67.1
Smokes Everyday/Somedays (%)	11.3	13.8	26.6	16.6	15.8	25.2
BMI	24.5	26.1	26.7	26.7	27.0	28.4
	4.4	5.4	6.1	5.9	5.1	6.4
Sleep Hours	7.4	7.2	7.1	7.2	7.0	7
	1.2	1.2	1.3	1.1	1.2	1.4
Demographic						
Age	26.4	28.3	26.1	43.3	46.7	48.6
	4.4	4.5	4.8	7.3	8.2	8.3
Female	.44	.55	.56	.50	.51	.53
	(.50)	(.50)	(.50)	(.50)	(.50)	(.50)
Educational Attainment (< High School Diploma=Omitted)						
High School Diploma	.30	.40	.55	.25	.32	.48
	(.50)	(.50)	(.50)	(.43)	(.47)	(.50)
Associate Degree/ Some College	.05	.07	.11	.07	.07	.12
	(.22)	(.25)	(.31)	(.25)	(.26)	(.33)
Bachelor's	.15	.14	.19	.18	.17	.18
	(.36)	(.35)	(.39)	(.39)	(.37)	(.39)
Graduate Degree	.11	.17	.05	.13	.09	.10
	(.31)	(.38)	(.22)	(.33)	(.29)	(.31)
Income Level (<$25,000=Omitted)						
$25000-44999	.26	.30	.25	.20	.26	.20
	(.44)	(.46)	(.43)	(.40)	(.44)	(.40)
$45000-74999	.14	.17	.21	.14	.22	.25
	(.34)	(.38)	(.41)	(.35)	(.41)	(.43)
$75000 +	.10	.17	.18	.14	.23	.32
	(.30)	(.38)	(.39)	(.35)	(.42)	(.47)
Observations	613	522	4238	301	1332	7594
Source: Author's calculations based off of NHIS, 2006						

Table 3.2 Summary Statistics, by age group (Standard Errors in Parenthesis)

	White, non-hispanic	Hispanic	African American	Asian
Behavioral Health Measures				
Good Health (%)	90.2	86.3	83.9	94.0
ADL performance (%)	97.0	98.0	97.0	99.2
Exercises 1 or more times per week (%)	71.4	52.2	58.6	66.4
Smokes Everyday/Somedays (%)	26.1	17.1	24.9	14.1
BMI	27.3	27.7	29.1	24.0
	(6.1)	(5.7)	(7.0)	(4.0)
Sleep Hours	7.1	7.2	6.9	7.0
	(1.3)	(1.3)	(1.5)	(1.1)
Demographic				
Age	41.7	36.6	39.3	38.1
	(12.9)	(11.8)	(12.4)	(11.8)
Female	.52	.52	.61	.48
	(.50)	(.50)	(.49)	(.50)
Educational Attainment (< High School Diploma=Omitted)				
High School Diploma	.48	.42	.54	.27
	(.50)	(.49)	(.50)	(.45)
Associate Degree/ Some College	.12	.07	.10	.08
	(.32)	(.26)	(.31)	(.27)
Bachelor's	.21	.09	.14	.35
	(.40)	(.28)	(.35)	(.48)
Graduate Degree	.10	.03	.06	.20
	(.30)	(.16)	(.23)	(.40)
Income Level (<$25,000=Omitted)				
$25000-44999	.21	.28	.26	.18
	(.40)	(.45)	(.44)	(.39)
$45000-74999	.25	.18	.18	.22
	(.43)	(.39)	(.38)	(.42)
$75000 +	.32	.13	.12	.34
	(.47)	(.33)	(.33)	(.47)
Observations	8703	2725	2404	768
Source: Author's calculations based off of NHIS, 2006				

Table 3.3 Summary Statistics, by age group (Standard Errors in Parenthesis)

	Male	Female
Behavioral Health Measures		
Good Health (%)	89.7	87.7
ADL performance (%)	97.8	96.9
Exercises 1 or more times per week (%)	66.3	64.6
Smokes Everyday/Somedays (%)	26.3	21.2
BMI	27.6	27.4
	(5.2)	(6.9)
Sleep Hours	7.0	7.1
	(1.3)	(1.4)
Demographic		
Age	40.3	40.0
	(12.8)	(12.7)
Educational Attainment (< High School Diploma=Omitted)		
High School Diploma	.46	.47
	(.50)	(.50)
Associate Degree/ Some College	.10	.11
	(.30)	(.32)
Bachelor's	.18	.18
	(.38)	(.39)
Graduate Degree	.09	.08
	(.29)	(.28)
Income Level (<$25,000=Omitted)		
$25000-44999	.23	.23
	(.42)	(.42)
$45000-74999	.24	.21
	(.43)	(.41)
$75000 +	.27	.24
	(.44)	(.43)
Observations	6832	7768
Source: Author's calculations based off of NHIS, 2006		

Table 3.4 Effects of Behavioral Variables on Self Reported Health Status, controlling for ADLs. (Standard Errors in Parenthesis)

	Age < 35						Age > 35					
	< 10 Years		10 + Years		Born in the US		< 10 Years		10 + Years		Born in the US	
	dF/dx		dF/dx		dF/dx		dF/dx		dF/dx		dF/dx	
Behavioral Health Measures												
No difficulty performing ADLs	.829	**	.712	**	.305	**	-		.597	**	.441	**
	(.171)		(.229)		(.070)				(.108)		(.033)	
BMI	-.003	**	-.001		-.003	**	-.004		-.002		-.005	**
	(.001)		(.002)		(.000)		(.002)		(.002)		(.001)	
Sleep	-.007		.003		.004		.009		.008		.005	
	(.005)		(.007)		(.002)		(.013)		(.007)		(.002)	
Smoker (Yes=1)	-.054		.033		-.014		-.060		-.036		-.054	**
	(.037)		(.017)		(.007)		(.061)		(.028)		(.009)	
Exercises (at least once per week=	-.036	*	-.001		.013		-.009	**	.016		.061	**
	(.015)		(.018)		(.007)		(.031)		(.019)		(.008)	
Demographics												
Female	-.013		.011		-.013		-.044		-.022		.000	
	(.014)		(.019)		(.006)		(.033)		(.019)		(.007)	
Age	.002		.001		-.002	*	-.003		-.006	**	-.004	**
	(.001)		(.002)		(.001)		(.002)		(.001)		(.000)	
Educational Attainment (< High School Diploma=Omitted)												
High School Diploma	.032		.042		.023	**	.073		.055	*	.044	**
	(.012)		(.020)		(.008)		(.026)		(.020)		(.010)	
Associate Degree/Some College	.019		-		.027	**	-		.012		.049	**
	(.013)				(.006)				(.035)		(.010)	
Bachelor's Degree	.018		.041		.045	**	.057		.067		.062	**
	(.012)		(.014)		(.006)		(.026)		(.024)		(.010)	
Graduate Degree	.023		-		.029		.042		.132	**	.076	**
	(.011)				(.007)		(.032)		(.017)		(.009)	
Income Level (<$25,000=Omitted)												
$25000-44999	-.031		.061	**	.013		-.007		.054		.058	**
	(.019)		(.019)		(.006)		(.040)		(.020)		(.007)	
$45000-74999	.015		.026		.020	**	-.036		.085	**	.086	**
	(.017)		(.017)		(.006)		(.058)		(.020)		(.007)	
$75000 +	-		-		.029	**	-		.124	**	.133	**
					(.006)				(.020)		(.008)	
Pseudo- R2	.23		.21		.14		.13		.17		.25	
Pro>X2	(.000)		(.000)		(.000)		(.073)		(.000)		(.000)	
Intercept‡	.788		-1.597		.961	*	2.965	**	.234		.681	**
	(1.286)		(1.410)		(.363)		(1.263)		(.555)		(.214)	
Obs. P	.949		.934		.945		.917		.835		.851	
Pred. P	.975		.964		.963		.942		.875		.901	
Observations	554		396		4274		240		1332		7669	

Source: 135 observations were dropped due to perfect correlation in the respective categories as noted by the dash. Author's calculations from NHIS, 2006.

Note: Dependent Variable is Health Status (1=good health, 0=less healthy)

** denotes significant at a 5% level, * denotes significant at a 10% level

‡ constant taken from Probit Model

Table 3.5 Effects of Behavioral Variables on Self Reported Health Status, controlling for ADLs. (Standard Errors in Parenthesis)

	White, non-hispanic		Hispanic		Black, non-hispanic		Asian, non-hispanic	
	dF/dx		dF/dx		dF/dx		dF/dx	
Behavioral Health Measures								
No difficulty performing ADLs	.400	**	.569	**	.573	**	.413	**
	(.035)		(.079)		(.070)		(.246)	
BMI	-.004	**	-.005	**	-.005	**	-.0001	
	(.000)		(.001)		(.001)		(.002)	
Sleep	.005	*	.001		.010		.009	
	(.002)		(.004)		(.004)		(.005)	
Smoker (Yes=1)	-.038	**	-.059	**	-.040		-.023	
	(.007)		(.018)		(.017)		(.023)	
Exercises (at least once per week=	.044	**	-.018		.032		.006	
	(.006)		(.012)		(.014)		(.014)	
Demographics								
Female	.001		-.081		-.090		-.011	
	(.005)		(.012)		(.014)		(.014)	
Age	-.003	**	-.005	**	-.006	**	-.002	**
	(.000)		(.000)		(.001)		(.001)	
Educational Attainment (< High School Diploma=Omitted)								
High School Diploma	.030	**	.040	**	.039		.009	
	(.007)		(.013)		(.018)		(.018)	
Associate Degree/Some College	.030	**	.047		.064	*	.005	
	(.007)		(.018)		(.018)		(.023)	
Bachelor's Degree	.048	**	.058	*	.074	**	.044	
	(.006)		(.047)		(.018)		(.018)	
Graduate Degree	.050	**	.062	*	.074		.038	
	(.005)		(.025)		(.022)		(.015)	
Income Level (<$25,000=Omitted)								
25000-44999	.064	**	.033		.048	**	.001	
	(.005)		(.013)		(.014)		(.018)	
45000-74999	.049	**	.075	**	.056	**	-.005	
	(.005)		(.012)		(.016)		(.020)	
75000+	.072	**	.099	**	.117	**	.028	
	(.006)		(.011)		(.012)		(.017)	
Pseudo- R2	.26		.19		.22		.17	
Pro>X2	(.000)		(.000)		(.000)		(.000)	
Intercept‡	.759	**	1.222	**	.727		-.363	
	(.120)		(.360)		(.334)		(.950)	
Obs. P	.902		.863		.839		.940	
Pred. P	.943		.899		.885		.963	
Observations	8703		2725		2404		768	

Source: Author's calculations from NHIS, 2006

Note: Dependent Variable is Health Status (1=good health, 0=less

** denotes significant at a 5% level, * denotes significant at a 10% level

‡ constant taken from Probit Model

Table 3.6 Effects of Behavioral Variables on Self Reported Health Status, controlling for ADLs. (Standard Errors in Parenthesis)

	Male		Female	
	dF/dx		dF/dx	
Behavioral Health Measures				
No difficulty performing ADLs	.382	**	.501	**
	(.046)		(.038)	
BMI	-.004	**	-.005	**
	(.001)		(.002)	
Sleep	.005		.005	*
	(.002)		(.002)	
Smoker (Yes=1)	-.039	**	-.039	**
	(.008)		(.007)	
Exercises (at least once per week=1)	.030	**	.031	**
	(.000)		(.007)	
Demographic				
Age	-.004	**	-.003	**
	(.000)		(.000)	
Educational Attainment (< High School Diploma=Omitted)				
High School Diploma	.030	**	.040	**
	(.007)		(.008)	
Associate Degree/Some College	.033	**	.044	**
	(.008)		(.008)	
Bachelor's Degree	.042	**	.066	**
	(.007)		(.007)	
Graduate Degree	.051	**	.069	**
	(.007)		(.007)	
Income Level (<$25,000=Omitted)				
25000-44999	.028	**	.042	**
	(.006)		(.006)	
45000-74999	.051	**	.058	**
	(.006)		(.006)	
75000+	.083	**	.084	**
	(.006)		(.006)	
Pseudo- R2	.22		.24	
Pro>X2	(.000)		(.000)	
Intercept[t]	1.164	**	.568	**
	(.227)		(.190)	
Obs. P	.897		.877	
Pred. P	.936		.921	
Observations	6832		7768	
Source: Author's calculations from NHIS, 2006				
Note: Dependent Variable is Health Status (1=good health, 0=less healthy)				
** denotes significant at a 5% level, * denotes significant at a 10% level				
t constant taken from Probit Model				

Chapter 4 Conclusion

It is clear looking at all the data that there are differences in health across race and ethnicity, gender, age, and years in the United States that cannot be explained by the socioeconomic and demographic variables used in this study. Using the Probit model, the evidence of a divide between actual and perceived health is apparent. A change in our style of thinking, as well as our style of living i.e. "The American Way", is necessary to help combat the health problems faced by our nation. The negative economic and societal effects have been made clear and now an answer to this problem needs to be found. If, as suggested by Yancey *et al.* (2006), a shift in our nation's emphasis on weight loss to physical activity is needed then policy makers should emphasize this lifestyle change. Encourage exercising which will most likely lead to healthy eating and other such habits that follow. Not many people want to work out after eating fast food or have a donut after they just went running so perhaps it will lead to help many of the other health factors and problems we are faced with.

Further research is needed to determine the factors that influence one's own perceived health and to what degree. A more in depth survey would be beneficial to explain the differences across race, gender, age, and years in the United States. Perhaps looking at multiple years would highlight where and at what age individuals start to notice that their health behaviors and choices impact their health status. Also, looking further into the lifestyle choices of Asian, non-Hispanics and those that have recently moved to the United States would help to explain what those in the

other categories are doing differently, since those are the two healthiest groups analyzed.

Future research would also involve including other variables such as marital status and health insurance. Using both variables as either independent variables or using them to classify groups to do cross comparisons would be useful in further understanding people's perceptions of health and health status. The marital status would be especially interesting to look at when comparing genders and testing the theory of psychosocial behaviors of women compared to men. Likewise, the insurance variable can be used to test the hypothesis developed in literature that people assume they are in good health until a health professional tells them otherwise.

Preliminary conclusions can be made that many of the respondents to this survey are not fully realizing health behaviors and their impact on a person's health. If a person cannot perform ADLs without difficulty then they must have some physical health problem that is holding them back from performing these tasks. Walking a few flights of stairs or getting dressed by one's self should be performed with no difficulty for a person in good health; however some people are still reporting good health even though they have difficulty doing these tasks.

Many smokers do not realize the effect that their habit has on their health in the long run, or if they do realize it then they are irrationally weighting the cost of quitting and fall into the problem of procrastination. Along the same lines is the difference between those reporting good health and those that are in the extreme obese BMI category. The numerous health factors associated with obesity have

been explained and yet many people in that range are still reporting good health. Even if some of the side effects of obesity have not yet been fully felt, the effect of such a disproportionate weight based on the person's height is undeniable felt.

This study explored the extent to which people link their behaviors to their health. The lack of accountability of one's actions appears to be widespread. The policy implication should focus on a lifestyle change and also a change in the way one thinks. Improving health through physical activity, not strictly weight loss encourages healthy living in all areas. Yancey et al. (2006) reported that physical inactivity resulted in negative self-perception. In a study where participants were required to participate in 10 minutes of moderate activity and then assess health immediately afterwards, the self reported health status of the individuals was lower and closer to their actual health status. This helped to clear the illusion of the persons previously believed fitness level. Not only did it make the person realize his fitness level but also through exercising, the physical effects of smoking and obesity can be felt immediately by most people. This implies that exercise could be the gateway towards a healthier America.

Another study that supports the implication of exercise as a possible cure for the obesity epidemic was done on High School students in the United States. Assessment of exercise, diet, and school environment was used in the analysis. Schools are increasing beginning to focus on healthier choices for school lunches. Twenty three percent of school environments did not provide a way for students to purchase sodas. However, the physical inactivity of the students is the key to fighting obesity in my opinion. In the study, 70 percent of students reported not

attending physical education classes daily and 65 percent of students did not meet recommended levels of physical activity. Also surprising was that 35 percent of students watched television and 25 percent played video or computer games for 3 or more hours on an average school day. Exercise habits should be developed before adulthood to hopefully set a path towards a healthy life. This would also hopefully help in decreasing child and teen obesity rates.

If poor health habits have already been formed, as they have been in most American adults, then another policy must be developed to get people to change to a healthy lifestyle. One suggestion would be to raise gas prices. Increases in gas prices have led to a sharp increase in sales of bicycles. In one survey, 95 percent of new bicycle owners cited high gas prices as their motivation for purchasing a bike as an alternate means of transportation (Bikes Belong Coalition 2008). Another study found a negative relationship between gas prices and obesity, citing low gas prices as partially to blame for the sharp increase in obesity throughout the 1980s (Courtemanche 2008).

The goal of this paper was to highlight the poor health habits and the lack of accountability for those actions. By analyzing different groups, policymakers can target the individuals based on their perceptions of health. A healthy status to one person is not a healthy status to another, as was seen in the analyses. By concentrating on preventing diseases associated with unhealthy habits that have become so common in the United States we can attempt to lower the personal and societal costs that stem from them.

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Appendix

Categories for regions used in the NHIS dataset.

	Category	Countries/regions included
1	Mexico, Central America, and Caribbean Islands	Mexico, all countries in Central America and the Caribbean Island area, including Puerto Rico
2	South America	All countries on the South American continent
3	Europe	Albania, Austria, Azores Islands, Belgium, Bosnia, Bulgaria, Corsica, Crete, Croatia, Czechoslovakia, Denmark, Finland, France, Germany, Great Britain, Greece, Herzegovina, Holland, Hungary, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Macedonia, M
4	Russia (and former USSR areas)	Russia, Lithuania, Latvia, Ukraine, and all places formerly a part of the USSR
5	Africa	All countries on the African continent, plus the Canary Islands, Comoros, Madagascar, Madeira Islands
6	Middle East	Aden, Arab Palestine, Arabia, Armenia, Bahrain, Cyprus, Gaza Strip, Iran, Iraq, Israel, Jordan, Kuwait, Syria, Lebanon, "Middle East," Oman, Palestine, Persia, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates, West Bank, Yemen
7	Indian Subcontinent	Afghanistan, Bangladesh, Bhutan, British Indian Ocean Territory, Ceylon, East Pakistan, India, Maldives, Nepal, Pakistan, Sri Lanka, Tibet, West Pakistan
8	Asia	Asia, Asia Minor, China, Japan, Mongolia, North Korea, South Korea
9	SE Asia	Borneo, Brunei, Burma, Cambodia, Christmas Island, Hong Kong, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Taiwan, Thailand, Vietnam
10	Elsewhere	Guam, Bermuda, Canada, Greenland, Oceania, as well as "At sea," "High seas," "International waters," "North America"
11	United States	The 50 United States and the District of Columbia

Note: Data taken from 2006 NHIS Survey Descriptions, pg 35-36

Categories for regions used for the WHO data

Category	Countries/regions included				
	Location	Population (in thousands) total	Year	Prevalence of current tobacco*	Year
1 Mexico, Caribbean, and Central America	Antigua and Barbuda	84	2006		
	Bahamas	327	2006		
	Barbados	293	2006	10.8	2005
	Belize	282	2006		
	Costa Rica	4399	2006	16.8	2005
	Cuba	11267	2006	35.9	2005
	Dominica	68	2006		
	Dominican Republic	9615	2006	15.4	2005
	El Salvador	6762	2006		
	Grenada	106	2006		
	Guatemala	13029	2006	14.4	2005
	Haiti	9446	2006		
	Honduras	6969	2006		
	Jamaica	2699	2006	15	2005
	Mexico	105342	2006	24.7	2005
	Nicaragua	5532	2006		
	Panama	3288	2006		
	Saint Kitts and Nevis	50	2006		
	Saint Lucia	163	2006	20.6	2005
	Saint Vincent and the Grenadines	120	2006		
	Trinidad and Tobago	1328	2006	22.1	2005
2 South America	Argentina	39134	2006	30	2005
	Bolivia	9354	2006	31.7	2005
	Brazil	189323	2006		
	Chile	16465	2006	37.9	2005
	Colombia	45558	2006		
	Ecuador	13202	2006	14.9	2005
	Guyana	739	2006		
	Paraguay	6016	2006	24	2005
	Peru	27589	2006		
	Suriname	455	2006		
	Uruguay	3331	2006	32.6	2005
	Venezuela	27191	2006	29.8	2005
3 Europe	Albania	3172	2006	22.4	2005
	Austria	8327	2006	43.3	2005
	Belgium	10430	2006	27.1	2005
	Bosnia and Herzegovina	3926	2006	42.3	2005
	Bulgaria	7693	2006	37.7	2005
	Croatia	4556	2006	34	2005
	Czech Republic	10189	2006	31	2005
	Denmark	5430	2006	33.4	2005
	Finland	5261	2006	28.1	2005

		France	61330	2006	31.7	2005
		Germany	82641	2006	31.6	2005
		Greece	11123	2006	51.8	2005
		Hungary	10058	2006	39.8	2005
		Iceland	298	2006	26.3	2005
		Ireland	4221	2006	26.3	2005
		Italy	58779	2006	26.1	2005
		Luxembourg	461	2006	34.7	2005
		Malta	405	2006	28.7	2005
		The former Yugoslav Republic of Macedonia	2036	2006		
		Netherlands	16379	2006	34.3	2005
		Norway	4669	2006	32	2005
		Poland	38140	2006	35.6	2005
		Portugal	10579	2006	35.8	2005
		Romania	21532	2006	32.6	2005
		Serbia	9851	2006	42.3	2005
		Slovakia	5388	2006	30.9	2005
		Slovenia	2001	2006	26.5	2005
		Spain	43887	2006	33.7	2005
		Sweden	9078	2006	22	2005
		Switzerland	7455	2006	26.5	2005
		The former Yugoslav Republic of Macedonia	2036	2006		
		United Kingdom	60512	2006	35.7	2005
4	Russia and Former USSR	Armenia	3010	2006	29.6	2005
		Azerbaijan	8406	2006		
		Belarus	9742	2006	42.6	2005
		Estonia	1340	2006	38.8	2005
		Georgia	4433	2006	31.9	2005
		Kazakhstan	15314	2006	26.6	2005
		Kyrgyzstan	5259	2006	24.7	2005
		Latvia	2289	2006	39.4	2005
		Lithuania	3408	2006	33	2005
		Russian Federation	143221	2006	48.5	2005
		Tajikistan	6640	2006		
		Turkmenistan	4899	2006		
		Ukraine	46557	2006		
		Uzbekistan	26981	2006	12.8	2005
5	Africa	Algeria	33351	2006	15.2	2005
		Angola	16557	2006		
		Benin	8760	2006		
		Botswana	1858	2006		
		Burkina Faso	14359	2006	16.6	2005
		Burundi	8173	2006		
		Cameroon	18175	2006	7.4	2005
		Cape Verde	519	2006		
		Central African Republic	4265	2006		
		Chad	10468	2006	9.4	2005
		Comoros	818	2006	20.7	2005
		Congo	3689	2006	6.6	2005

		Cote d'Ivoire	18914	2006	9	2005
		Democratic Republic of the Congo	60644	2006	8.1	2005
		Equatorial Guinea	496	2006		
		Eritrea	4692	2006	9.1	2005
		Ethiopia	81021	2006	4.3	2005
		Gabon	1311	2006		
		Gambia	1663	2006	16.2	2005
		Ghana	23008	2006	5.5	2005
		Guinea	9181	2006		
		Guinea-Bissau	1646	2006		
		Kenya	36553	2006	14.7	2005
		Lesotho	1995	2006		
		Liberia	3579	2006		
		Madagascar	19159	2006		
		Malawi	13571	2006	15	2005
		Mali	11968	2006	11.2	2005
		Mauritania	3044	2006	13.1	2005
		Mauritius	1252	2006	18.5	2005
		Republic of Moldova	3833	2006	26	2005
		Mozambique	20971	2006	12.8	2005
		Namibia	2047	2006	24.9	2005
		Niger	13737	2006		
		Nigeria	144720	2006	7.1	2005
		Rwanda	9464	2006		
		Sao Tome and Principe	155	2006	16.9	2005
		Senegal	12072	2006	10.7	2005
		Seychelles	86	2006	21.2	2005
		Sierra Leone	5743	2006		
		South Africa	48282	2006	18.4	2005
		Swaziland	1134	2006	8.9	2005
		Togo	6410	2006		
		Uganda	29899	2006	12.1	2005
		United Republic of Tanzania	39459	2006	14.6	2005
		Zambia	11696	2006	13.4	2005
		Zimbabwe	13228	2006	15	2005
6	Middle East	Bahrain	739	2006	14.6	2005
		Iran (Islamic Republic of)	70270	2006	17.6	2005
		Iraq	28506	2006	14.2	2005
		Jordan	5729	2006	36.5	2005
		Kuwait	2779	2006		
		Lebanon	4055	2006	18.1	2005
		Oman	2546	2006	13.1	2005
		Qatar	821	2006		
		Saudi Arabia	24175	2006	14.7	2005
		Syrian Arab Republic	19408	2006		
		United Arab Emirates	4248	2006	14.4	2005
		Yemen	21732	2006		
		Armenia	3010	2006	29.6	2005
		Cyprus	846	2006		
		Israel	6810	2006	24.6	2005

7	Indian Subcontinent	Afghanistan	26088	2006		
		Pakistan	160943	2006	21.1	2005
		Bangladesh	155991	2006	25.6	2005
		Bhutan	649	2006		
		India	1151751	2006	18.6	2005
		Maldives	300	2006	28.2	2005
		Nepal	27641	2006	30.6	2005
		Sri Lanka	19207	2006	16.5	2005
8	Asia	Democratic People's Republic of Korea	23708	2006		
		China	1328474	2006	31.8	2005
		Japan	127953	2006	29.4	2005
		Mongolia	2605	2006	26.3	2005
9	SE Asia	Indonesia	228864	2006	35.4	2005
		Myanmar	48379	2006	30.2	2005
		Thailand	63444	2006	21.7	2005
		Brunei Darussalam	382	2006		
		Cambodia	14197	2006	23.6	2005
		Lao People's Democratic Republic	5759	2006	40.5	2005
		Malaysia	26114	2006	28.8	2005
		Philippines	86264	2006	26	2005
		Singapore	4382	2006		
		Viet Nam	86206	2006	24.3	2005
10	Elsewhere	Canada	32577	2006	21.6	2005
		Australia	20530	2006	24.8	2005
		Fiji	833	2006	14.4	2005
		Kiribati	94	2006		
		Marshall Islands	58	2006		
		Micronesia (Federated States of)	111	2006		
		Nauru	10	2006	49.2	2005
		New Zealand	4140	2006	28.6	2005
		Palau	20	2006	24	2005
		Papua New Guinea	6202	2006		
		Samoa	185	2006	41	2005
		Solomon Islands	484	2006		
		Tonga	100	2006	39	2005
		Tuvalu	10	2006		
		Vanuatu	221	2006	28.8	2005
11	United States of America		302841	2006	23.9	2005

Note: Data taken from the WHO Statistical Information System. Country lists compiled by author in relation to categories created by NHIS

* Tobacco use among adults >=15 years (%) both sexes