Health Effects of the American Diet: The Case of Immigrants*

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Abstract

We compare body mass index (BMI) of immigrants in the United States to natives'. We observe that (on average) immigrants' BMI converges to natives' as their length of U.S. residency increases. For the analysis, we use the National Health and Nutritional Examination Survey (NHANES), a nationally representative cross-sectional survey that contains extensive microdata on demographics, health, weight history, nutrition, physical activity, and more. We observe immigrants' time since migration, which allows us to isolate differences in their attributes, conditional on their duration of residency. We find that BMI convergence persists across all age groups after controlling for a large set of demographic and physical characteristics. We explore the root causes of this "catch-up effect," determining that it occurs primarily because of changes in nutrition: the longer immigrants live in the United States, the more likely they are to adopt high-fat diets. We find further evidence of the importance of dietary choices by noting that immigrants' physical activity levels actually improve with their length of residency, conditional on observable characteristics.

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1 Introduction

One out of every eight persons in the United States of America is foreign-born. According to the 2009 American Community Survey, almost 40 million immigrants claim the U.S. to be their country of residence.[1] A migratory process affects the lives of immigrants as well as the recipient community. An immigrant assimilates along socioeconomic, cultural, and civic dimensions in the host country. Movement across borders and the consequential acculturation might necessitate lifestyle changes. Health is one of the dimensions of an immigrant's life that could be affected and bears extensive study. The sheer magnitude of immigrants along with their differing ethnicities and socioeconomic backgrounds can spell changes in health care provisions and costs for the United States.

In this paper, we study the impact of immigration and length of stay on the weight-related health of an individual, captured by his or her body mass index (BMI).[2] Diet and exercise together determine the BMI of an individual. As part of the process of assimilation, an immigrant may have to adopt food types and habits common to the rest of the U.S. population. Alternatively, an immigrant may adhere to the cuisine of their native country even if they mostly use locally-available ingredients. By virtue of being a "richer" and "more developed" nation than many of the home countries of today's immigrants, the U.S. is able to provide healthier and multiple varieties of food to immigrants. Immigrants may also have to implement changes in their levels of physical activity as a result of their new occupations and living conditions. Immigrants are more likely than natives to work in jobs involving heavy levels of activity.[3] On the other hand, any benefits from

[1] An immigrant is any person born outside the 50 contiguous states. People born in U.S. territories like Puerto Rico or a U.S. island area are considered to be immigrants in this paper even though they enjoy U.S. citizenship.

[2] An individual's weight in kilograms divided by the square of his or her height (in meters). See Section 3 for more details.

[3] Table B.1 shows that immigrants are 1.6 percentage points more likely to engage in "heavily active" jobs.

physical activity or abundance of good food options can be offset by unhealthy eating. Dietary habits of the American population have often been criticized for being high in sugars and fats. It is natural to presume that the decision to immigrate and reside in another country could spell changes in an individual's BMI.

We use the National Health and Nutritional Examination Survey (NHANES) to compare the BMI of immigrants in the U.S. to natives' and investigate reasons behind any observed changes in the BMI of immigrants. The NHANES, conducted by the CDC, is a multiple year, nationally representative cross-sectional survey which contains extensive microdata on demographics, health, weight history, nutrition, physical activity and more. We use data from both the interview and examination modules of the survey. The interview provides self-reported information on an individual's demographics, health, and activity histories. The examination provides a lab-conducted BMI measure which we use in our study.[4]

The data reveals that recently-arriving immigrants have a lower BMI than natives–depending on age group, between 2.2 to 4.0 points lower for immigrant men and 2.7 to 5.5 points lower for immigrant women. We find that both male and female immigrants close this gap as they continue to reside in the U.S., and the rate of convergence is about a tenth of a point per each additional year of residency, holding all other observable characteristics constant. The convergence rate for immigrants is almost twice the rate of BMI-gain associated with normal aging.[5] We check the robustness of this result by estimating alternative models of BMI changes, instead of BMI levels, as well as by estimating the model on subsamples that are stratified by income and gender. We also investigate the possibility that compositional changes in the immigrant population, such as the systemic return-migration of thinner immigrants, could contribute to BMI convergence. We find no evidence that such compositional changes cause the "catch-up" effect.

[4]It is crucial that we use the BMI results from the examination module. There are gender and age-specific biases in self-reports of height and weight. Men and women significantly over-report their height, increasingly so at older ages. Men tend to overestimate their weight, but women under-report their weight, more so in younger ages. Corresponding BMI is underestimated, more so for women than for men at each age and increasingly so with older age for both sexes (Merrill and Richardson (2009)).

[5]This comparison comes from a simple OLS regression of BMI on age using our pooled sample that yields a coefficient estimate of .059, which is significantly less than the estimated BMI gain for immigrants of about .1 points per year.

The "catching-up" phenomenon in BMI could be the result of higher caloric intake, a diet rich in fatty and unhealthy foods, or the lack of physical activity (or combinations of these). A decomposition of immigrants' BMI convergence suggests that (depending on age group) up to 17% of the rise in their BMI can be attributed to observable dietary information. Additionally, direct inspection of dietary choices shows that the longer immigrants stay in the U.S., the more their food habits converge to that of natives. In particular, immigrants adopt significantly fattier diets, but we find either small or zero measurable changes in their protein, carbohydrate, or total caloric intake. This highlights our main finding. All else being equal, immigrants transition to high-fat diets—a transition that coincides with their continued U.S. residency—is the main observable contributing factor to their BMI catch-up. On the other hand, we find that immigrants who recently entered the U.S. engage in *lower* levels of physical activity compared to natives, and this discrepancy diminishes as their length of residency increases. Thus the BMI-gain from dietary changes is large enough to overcome any beneficial effects of more exercise.

The rest of the paper is organized as follows. Section 2 presents a literature review of the existing work on immigrant health and weight. Section 3 discusses the data extracted from the NHANES. Section 4 presents the results of BMI convergence and robustness checks. Section 5 investigates the dietary and behavioral factors underlying the catch-up and Section 6 concludes.

2 Literature Review

Obesity rates have risen across all industrialized countries in recent decades. However, the rates of overweight and obesity in the U.S. are higher than other developed nations (Streib (2007)). Obesity is now considered an epidemic in the U.S. (Ogden et al. (2007)). As of 2010, the Center of Disease Control categorizes 66% of the population as overweight and 35% as obese. While the percentage of men and women who are overweight has stayed more or less constant over the last 50 years, the proportion of adults in the U.S. now recognized as being obese has more than doubled (Nguyen and El-Serag (2010)). Obesity is the leading cause of many health problems including diabetes,

hypertension, cardiovascular disease, and even cancer. Almost 110 thousand additional deaths each year can be attributed to obesity-related diseases (Flegal et al. (2005)).[6] Obesity-attributable medical expenses cost the U.S. taxpayer about $75 billion annually (Finkelstein et al. (2004)). In the context of the obesity-related epidemic, it becomes important to study the health of immigrants as their numbers increase in the U.S. and they continue to assimilate.

An unhealthy BMI is an outcome of "energy imbalances." This involves eating too many calories and not getting enough physical activity (U.S. Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity, 2001). The rise in proportion of American adults who are obese can be traced to the increase in calorie intake. The easy availability of "externally" prepared processed food and "snacking" have contributed to this trend (Cutler et al. (2003)). The Center for Disease Control's *State Indicator Report on Fruits and Vegetables 2009* references the unhealthy eating habits of U.S. adults - 33% of adults eat the recommended daily two or more servings of fruits and merely 27% of adults consume the targeted three or more servings of vegetables. Eating healthy according to federal guidelines costs the average American adult more.[7] Physical exercise interventions, on the other hand, are seen to have limited success in reducing obesity among children and adults (Henderson et al. (2008)).

Conditional on dietary and physical activity preferences, researchers have considered the health status of immigrants and changes to this status as the foreign-born continue to reside in the U.S. Immigrants comprise over 12.5% of the U.S. population, and their children account for almost a quarter of U.S children. Research on height showed that children born to European immigrants in the mid-20th century in the United States were taller and had larger heads and broader facial features than their foreign-born parents and siblings. Nutrition was cited as the main cause for "taller" generations.[8] Immigrants originate in countries where the prevalence of obesity is lower (Streib

[6]This is 4.5% of the total annual deaths.

[7]The Federal Dietary Guidelines for Americans, 2010, emphasized the need for Americans to consume more potassium, dietary fiber, vitamin D, and calcium. Increasing the consumption of potassium, which is the most expensive of the four recommended nutrients, would add $380 per year to the average consumer's food costs. The average adult already spends about $4000 per year on food (Monsivais et al. (2011)).

[8]The height of the European stock of immigrants in the U.S. has hit its plateau. Height increases are mainly seen in the Asian and Hispanic immigrant populations living in the United States.

(2007)). There is also evidence to show that immigrants enter the U.S. "thinner" than natives (Goel et al. (2004)). As in our study, these researchers also find that as immigrants continue to reside in the U.S., their weight increases, but they do not investigate the underlying reasons. Gordon-Larsen et al. (2003) compared foreign-born children in the United States to U.S.-born children of immigrants and found that foreign-born children also tend to exhibit less "overweight-related" behavior. Our study strives to strengthen these findings via use of broader and more precise NHANES data, robustness checks, and more comprehensive examination of the contributing factors to BMI convergence.

In particular, we investigate the main causes of immigrants' weight gain - whether diet and exercise contribute, and to what extent. Several other studies have examined related topics applied to single-nationality subsamples of the immigrant population. Researchers have found that cultural beliefs play an important role in dietary practices. The diet of older immigrants has a "traditional" bias, whereas younger immigrants tend to be indifferent between American and ethnic diets. It has been documented that Chinese immigrants increase their consumption of Western foods and decrease the consumption of ethnic foods as they acculturate (Lv and Cason (2004)). The convenience and wide availability of American foods is cited as the reason for their widespread appeal (Satia-Abouta et al. (2002)). The desire to fit in and belong to American society prompts some immigrant groups to adopt foods they perceive to be prototypically American (Guendelman et al. (2011)).

As mentioned previously, eating healthy costs more (Monsivais et al. (2011)). Additionally, a disproportionate number of immigrants are concentrated in the bottom quartile of the income distribution (2010 U.S. Census). It might be conjectured that immigrants may be less able to afford healthy food compared to natives and this contributes to their weight gain. Researchers also show that new immigrants, especially those living in low-income densely populated neighborhoods, are more likely to engage in physical activity—like using bicycles to travel to work—than natives (Smart (2010)). Alternatively, adopting a more sedentary lifestyle as immigrants continue to reside in the U.S. may contribute to weight gain. In one study, while children of Guatemalan immigrants

are taller than their Guatemalan counterparts, the ones who report watching TV and playing video games as their primary leisure activity are more likely to be obese (Smith et al. (2002)).

Our paper adds to the existing body of literature on immigrant health by isolating the factors that contribute to changes in immigrant BMI. The next section describes the NHANES and the data used in our analysis.

3 Data Description

We utilize data from the National Health and Nutrition Examination Survey (NHANES), a multi-year cross sectional study conducted by the Centers for Disease Control. The NHANES surveys a nationally representative sample via both interviews and formal medical examinations. The most modern form of the NHANES was introduced in 1999, with new cross sections of data gathered every two years. The biennial cross sections are labeled "2001-2002," "2003-2004," etc., because the data collection process overlaps the calendar year. Our analysis combines data from three waves, starting with the 2003-2004 collection and finishing with 2007-2008. It is important to note that our dataset is not a panel; it is a large cross section built from four smaller ones.

The NHANES over-samples individuals over age 60, African Americans, and Hispanics. Each cross section contains sampling weights, strata, and clustering variables to properly account for the complex survey design. Due to its size and structure, many NHANES respondents are immigrants.

The NHANES is split into two main components: an interview and an examination. Interviews are conducted in respondents' homes, and examinations take place in large mobile trailers under the supervision of doctors and medical technicians. From the interview component, we utilize questionnaire modules on family and individual demographics, weight history, smoking habits, health insurance status, dietary information, and physical activity levels. From the examination, we take Body Mass Index (BMI), a broadly accepted proxy used to classify an individual as underweight, normal weight, overweight, or obese. BMI is equal to an individual's weight in kilograms divided by the square of his or her height (in meters). BMI values less than 18.5 correspond to

underweight status, 18.5-25 are healthy weights, 25-30 are overweight values, and measurements over 30 classify an individual as obese.[9]

Some respondents complete the interview but not the examination. Since BMI is a crucial variable in our study, we only use data from examination-takers (about 95% of the sample). Additionally, we only consider respondents who completed the entire dietary questionnaire (about 85% of the remaining sample). Although this introduces the potential for selection bias, the NHANES provides an additional set of sampling weights that is for the subsample of dietary survey-takers. To check distributional consistency, Figure A.1 presents a few key variables' distributions from both the full sample and the restricted subsample. There are no notable differences.

We restrict our sample to examination-takers from the 2003-2004, 2005-2006, and 2007-2008 surveys who are at least 20 years old but less than 70. There are 12,789 individuals who meet these criteria. We exclude pregnant women (626 observations),[10] extremely underweight individuals with BMI less than 15 (4 observations), and exceedingly overweight individuals with BMI greater than 75 (2 observations).[11] We omit respondents with missing values for examination-BMI (637 observations–as discussed in the previous paragraph), two-day dietary survey responses (1,785 observations-also discussed above), education level (2 observations), smoking habits (3 observations), immigration status (59 observations), and physical exertion characteristics (6 observations). This leaves us with a final sample size of 9,665 individuals, with 2,127 immigrants in this sample.

Table B.1 contains summary statistics for notable variables, divided into two groups, natives and immigrants. The data supplies information on gender and five races or ethnicities: Mexican Hispanic, white, black, non-Mexican Hispanic, and other race. The average BMI is 28.8 for natives and 27.1 for immigrants.[12] The NHANES also provides health insurance status (covered or not), marital status (married, previously married, never married), and smoking behavior (never smoked, smoked but quit, smokes every day, smokes occasionally). For the pooled sample (not

[9]Interested readers may refer to the World Health Organization's website for more details on BMI.

[10]We also exclude responses for whom we "cannot ascertain if pregnant at the exam."

[11]For example, an individual who is nearly 6 feet tall and 600 pounds.

[12]The average individual in the United States is overweight. See Figure A.1 for more detailed information on age and BMI distributions.

shown in the table), approximately 79% of the sample has insurance, 65% is married, and 52% has never smoked. We split physical activity characteristics into labor-related and leisure-related variables. Each has three levels of strain: sedentary, moderate, heavy (or vigorous).[13] We also have information on respondents' nutritional choices; Section 5 provides specifics on these variables. Education levels are split into five groups, with the lowest having no years of high school education and the highest having a college degree or above. About a quarter of the pooled sample has a college degree and less than 16% has no high school degree. Table B.2 contains information on an immigration status variable that reports whether the respondent was born in the U.S. and if not, how long he or she has been in the U.S.[14] 78% of respondents are natives, and the remaining 22% are distributed amongst the various residency-length bins (Figure A.1 also shows the distribution).

4 Results

This section presents some descriptive statistics and the main regression results and robustness checks.

[13]The labor-related questions are phrased as follows:

> "Next I am going to ask you about the time you spend doing different types of physical activity in a typical week. Please answer these questions even if you do not consider yourself to be a physically active person. Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, studying or training, household chores, and yard work. In answering the following questions, 'vigorous-intensity activities' are activities that require hard physical effort and cause large increases in breathing or heart rate, and 'moderate-intensity activities' are activities that require moderate physical effort and cause small increases in breathing or heart rate. Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like carrying or lifting heavy loads, digging or construction work for at least 10 minutes continuously?"

The leisure-related questions are phrased similarly:

> "The next questions are about physical activities including exercise, sports, and physically active hobbies that you may have done in your leisure time or at school over the past 30 days. First I will ask you about vigorous activities that cause heavy sweating or large increases in breathing or heart rate. Then I will ask you about moderate activities that cause only light sweating or a slight to moderate increase in breathing or heart rate. Over the past 30 days, did you do any vigorous activities for at least 10 minutes that caused heavy sweating, or large increases in breathing or heart rate? Some examples are running, lap swimming, aerobics classes or fast bicycling."

[14]Duration of stay is measured in five or ten year ranges.

4.1 Trends in BMI

Since the NHANES is not a panel study, we cannot track particular respondents' BMI changes over time. Instead, we utilize the survey question regarding respondents' immigration status (whether native or immigrant, and if the latter, their length of U.S. residency) to calculate sample averages of BMI conditional on both weight and length of residency. Figure A.2 compares sample mean and 95% confidence intervals of immigrants' BMI to the sample mean of natives' BMI, grouped by age, gender, and length of stay in the United States. The most notable feature of nearly every graph is the convergence of immigrants' BMI to native levels, over time. This holds true for men, women, and the full sample, although it is less pronounced for the oldest age group. Additionally we see that only a small number of group means convey healthy average weight levels (recalling that overweight is designated by BMI from 25-30 and obesity is given by BMI over 30). The healthiest-weight groups are the youngest and most recent immigrants. Thus the plots suggest that the BMI increase is not merely a "healthy fattening" of immigrants who might otherwise be "too thin" or malnourished, but it is genuine convergence to the unhealthy weight levels of natives in all age groups. The remainder of this section examines the catch-up phenomenon in greater detail.

4.2 OLS Regressions

In various applications, previous studies have estimated the associations between BMI and observable characteristics using OLS (Cawley (2004); Chou et al. (2004); Philipson and Posner (1999)).[15] Following this literature, we control for BMI-affecting observables that can be found in the NHANES to see if the acculturation effect for immigrants persists. In other words, if immigration status remains statistically significant after implementing controls, then OLS provides further evidence that the catch-up effect is genuine and robust. The general OLS specification is as follows, where we model a linear relationship between individual i's body mass index (BMI_i), and his or her observable covariates (X_i), time in the United States (YrsInUSA_i), and a constant term

[15]The cited papers focus on the study of how obesity may impact wage determination.

(α):

$$\text{BMI}_i = \alpha + \theta X_i + \beta \text{YrsInUSA}_i + u_i \tag{4.1}$$

u_i includes all unobserved characteristics that affect BMI_i. X_i includes race, age, gender, survey cohort, education level, family income quartile, health insurance status, marital status, smoking behavior, and occupation-related physical intensity. We estimate two different specifications of the YrsInUSA_i indicator because the NHANES provides only five to ten year bins:

1. A linear form in which YrsInUSA_i is set equal to the midpoint of each bracket (i.e. we assign 7.5 years to immigrants reporting 5-10 years of U.S. residency). YrsInUSA_i is set equal to zero for natives, and we add a binary indicator to identify natives versus immigrants.

2. A more flexible estimation of the residence effect by using dummy variables for each five or ten year range of stay. The base category is for U.S.-born natives.

We interpret β as the "environmental component" of BMI due to years in the United States. Attributes such as nutrition and exercise levels, as well as their prices and availability, are the primary conjectured components of YrsInUSA_i. In these models, the effects of diet and exercise are not disentangled and are combined in the YrsInUSA_i variable to capture the "full" catch-up effect. We more closely decompose and examine the diet and exercise components in Section 5.

We perform the regressions on separate ten-year age group subsamples. Tables B.3, B.4, and B.5 contain OLS estimation results from the full sample and from additional subsamples of men and women, respectively. The pooled sample results imply that across all age groups, less educated individuals tend to have a higher body mass index. In particular, those with a high school diploma have a higher BMI by 1.7 to 2.4 points (all else equal) compared to college graduates, depending on age group. African Americans and Hispanics also tend to have a higher BMI. Womens' BMI tends to be lower than male BMI on average, although the difference is small (less than 1 point) and insignificant for most age groups. Individuals with moderate and heavy physical occupations are thinner by 0.7 to 1.9 points, although the difference is not significant for individuals in the 20-29 age range. Everyday smokers tend to be thinner, with average BMI differences ranging from

1.1 to 3.3 points less than non-smokers.[16] Estimates for family income quartile coefficients are likely insignificant because of their strong correlation with education level. We find no notable differences in the survey reporting years nor amongst individuals with and without health insurance. These results are similar to the separated samples of men and women (Tables B.3 and B.4), although statistical significance in these models is likely hampered by smaller sample sizes. There are a few exceptions: BMI differences in race and ethnicity are much more pronounced for women than for men. The same is true for education in the younger three age groups; less educated women have a higher BMI (ranging from 2-4.5 points) than their college educated counterparts. For men, this BMI difference ranges only from 0-1.7 points. Males' race and education do not have as much explanatory power, but men in the two oldest age groups who were never married tend to be thinner by 1.8 to 2.5 points (compared to married men), while never-married women of similar age tend have a larger BMI of 3.0-3.4 points. We also observe that the "thinning effect" of smoking is larger for women than for men. For all regressions, R^2 statistics tend to be about 0.10.

We are primarily interested in the "Years in USA" immigration status indicators. The pooled sample results imply that natives' BMI is on average 2.6-4.4 points larger than immigrants'. With each additional year of residency, immigrants in the younger three age groups experience BMI gains of .08-.10 points, but we cannot reject that the convergence effect is different from zero for the older two age groups. We observe similar patterns in the gender-stratified samples, where female immigrants tend to be thinner (relative to natives) than their male counterparts. All but two of the convergence coefficients in these subsamples are insignificant (likely due to the smaller sample size), but they are all positive and of comparable magnitude to the pooled sample estimates. Table B.6 presents results from the second specification, in which "Years in USA" is represented by a categorical dichotomization of five and ten-year age bins. For these regressions, we use only three age groups (20-34, 35-49, and 50-69) to ensure that each residency bin contains enough observations. We observe a similar catch-up for the younger two age groups that has a similar magnitude to the linear models. The BMI of immigrants in the oldest age group approaches that of

[16] Occasional smokers exhibit the same trend, although it is not significant for younger age groups.

natives, but there is always a statistically significant difference. The main result of these regressions is clear: Cleansed of observable characteristics, new immigrants tend to be thinner than natives, but their BMI converges as their length of stay increases (particularly for those under age 50). The next three subsections propose robustness checks for these results.

4.3 Robustness Check: BMI Changes

Although the NHANES is not a panel study, its questionnaire module on weight history provides a convenient means to check the robustness of the convergence result. In particular, the NHANES contains a question phrased as follows:

> "How much did you weigh a year ago? [If you don't know your exact weight, please make your best guess.]"

On average, individuals gain weight as they age. But if it is true that immigrants gain weight at a faster rate than natives (as our results imply), then we would expect this to be reflected in the difference between current BMI and self-reported past BMI. Note that this is a rough test because one-year weight changes may be small and unpredictable. Additionally, Merrill and Richardson (2009) documented that self-reports of BMI tend to be at-odds with objective laboratory measurements (which we use everywhere else in this study). Self-reports are typically too low for women and too high for men, so weight changes in the past year may be either overstated or understated.

For this test, we perform an OLS regression of the *one-year change* in BMI on the same set of explanatory variables from the main regressions of Eq. (4.1). We consider two different forms of the one-year change in BMI:

1. The difference between current laboratory-measured BMI and self-reported past BMI

2. The difference between current self-reported BMI and self-reported past BMI

The second form may avoid possible biases found in the self-reports by differencing them out. We do not stratify the sample by age groups, because we need the larger (entire) sample to have any predictive power for BMI changes. Instead, we include a second-order polynomial for age. Age group subsamples are not as necessary as before because while BMI levels greatly differ by age groups (causing correlational problems with the length-of-residency indicators), BMI changes remain relatively consistent in magnitude across ages.

Table B.7 contains results from this regression. For brevity, we do not report coefficient estimates of race/ethnicity, survey cohort, insurance status, and marital status, but all covariates were included in the estimations. Low R^2 statistics imply that we do not have high predictive ability in these models. In the examination-measured BMI models, women and individuals without college degrees experience faster weight gains. In the model with linear "Years in USA," while estimates are not statistically significant, natives tend to experience smaller annual BMI gains by .27 points, and immigrants' BMI gains tend to be larger by .003 points per additional year of residency. Results for the self-reported BMI model are similar. In the models with non-linear "Years in USA," nearly all coefficient estimates for the immigration status dummies are positive, but they are only significant for those with 0-10 years of residency and for those with 40-50 years of residency. Given the lack of precision, we are hesitant to directly interpret the coefficients, but we view this as further evidence of a measurable catch-up effect.

4.4 Robustness Check: Income and Gender Stratifications

It is possible that the convergence is unique to particular income levels due to food pricing, availability, or other reasons. Although the baseline models control for income and gender, we further examine this question by concentrating the analysis on subsamples stratified by income quartile and gender. To minimize small sample size issues, we use larger age groups (20-34, 35-49, 50-69) and strictly the linear form of "Years in USA." Table B.8 contains estimates of the immigration status coefficients for the stratified models. Due to small sample size, standard errors are noticeably larger, resulting in "rougher" estimates, however we still observe BMI convergence. In nearly

every income quartile, natives significantly outweigh immigrants. The coefficient on "Years in USA" is positive in most of these regressions (20 of 24), is significant in many (7 of 24), and is of similar magnitude to the main models (ranging between about .05-.20). In summary, this test provides further evidence that the "catch-up" effect is robust to socioeconomic status.

4.5 Robustness Check: Compositional Changes in Immigrant Populations

One might conjecture that changes in the composition of immigrants (at different age groups) may strongly contribute to the catch-up phenomenon. For instance, immigrants may gain weight more quickly than their native counterparts because a larger proportion of them may switch from physically taxing occupations to sedentary ones.[17] A simple examination of conditional proportions reveals that this is not the case: 17.6% of both natives and immigrants ages 20-34 engage in heavily strenuous occupations. This figure decreases to 13.3% for middle aged (ages 35-49) natives and to 14.1% for middle aged immigrants. For the oldest age group (50-69) these estimates decrease to 9.1% for natives and to 11.4% for immigrants. Additionally, confidence intervals for these proportions are largely overlapping for immigrants and natives in all three age groups. If anything, a slightly *lower* proportion of immigrants switch out of physically intensive jobs, implying that such a compositional change is not likely to be driving the BMI convergence.

Another plausible compositional change is that the catch-up may be, at least partially, the result of return migration of thinner immigrants. Without panel data, it is impossible to perfectly identify such a transition, but we can perform a simple quasi-cohort analysis instead. Previous results have shown that education level is a strong predictor of body mass index; thinner individuals tend to have more education. If low-BMI immigrants exit the U.S. in higher proportions than those with high-BMI, then we would expect the average education level of our sample of immigrants to decease as they age. Starting with immigrants ages 30-39 (individuals in their twenties are often still in school), 44.4% have some college, an Associate of Arts (A.A.) degree, or possess a

[17] While still interesting, this would diverge from the "contributing factors" studied intently in Section 5, where we focus on nutrition and *leisure-related* physical activity.

Bachelor's degree. This statistic increases to 53.4% for immigrants in their forties, and decreases only slightly to 50.7% for those in their fifties. 50.1% of the oldest group of immigrants (ages 60-69) possess this degree level. Indeed, the education level of immigrants has decreased with age, but the data indicates that this is so for the sample as a whole. Thus it is better to compare immigrants' proportional *changes* to natives' to see if there is a large discrepancy. The post-high school education proportions for the same four age groups of natives are, respectively: 64.8%, 63.1%, 61.8%, 54.2%. While the education levels of immigrants are lower than natives', we actually witness a *smaller* proportional decline for immigrants in the older age groups. Thus there is no evidence that more highly educated immigrants return home. Since such compositional changes are not present, we hypothesize that BMI convergence is driven primarily by other factors, namely diet and physical activity. The next section investigates these underlying forces.

5 Nutrition and Physical Activity

Beginning with the 2003-2004 wave, the NHANES implemented a comprehensive dietary questionnaire. In addition to adding many detailed questions about daily nutrition, surveyors began to collect dietary information from two distinct days during the same week of the interview. This provides much more precision (than a single day sample) in the measurement of dietary habits, which tend to be volatile on a day-to-day basis.[18] The dietary module contains a raw file of individual foods taken by each respondent on both survey days. Using a USDA food code database,

[18]The following excerpt is taken from NHANES documentation:

> "The dietary intake data are used to estimate the types and amounts of foods and beverages consumed during the 24-hour period prior to the interview (midnight to midnight), and to estimate intakes of energy, nutrients, and other food components from those foods and beverages....One of the most important changes is the release of two days of intake data for each participant. The first day (Day 1) is collected in the Mobile Examination Center (MEC) and the second day (Day 2) is collected by telephone 3 to 10 days later. Most MEC participants (87 percent) have 2 days of complete and reliable intakes. The release of 2 days of data will permit the estimation of usual (long-run average) nutrient intakes in order to assess diets in the U.S. The Institute of Medicine recommends that assessment of the diets of population groups in relation to Dietary Reference Intakes be based on usual intake distributions of nutrients (Institute of Medicine, 2000). A minimum of two nonconsecutive days of dietary intake data for at least a sub-sample of the individuals is necessary for a more accurate estimation of the usual intake of nutrients."

the NHANES aggregates the individual foods information into a file of total nutrient intakes for each individual on each survey day. We use information on total caloric intake, total fat intake, total sugar intake, total protein intake, and total carbohydrate intake.[19] In addition, we observe the day of the week for each nutritional interview and whether the individual reports being on a diet. This information, along with data on respondents' physical activity levels at leisure, allows us to evaluate the relative importance of diet and exercise in the context of the catch-up effect. We propose two methods of examination: a regression decomposition and a simple OLS approach.

5.1 Regression Decomposition

We perform a decomposition of the catch-up effect for the three larger age groups (20-34, 35-49, and 50-69). For this analysis, we consider only the subsample of immigrants. We define the "catch-up size" for each immigrant as the average BMI of natives within the corresponding age group minus immigrants' own BMI. In other words, we define a new variable for each immigrant i: $\text{CatchUp}_i = \overline{\text{BMI}}_{\text{Native,AgeGrp}} - \text{BMI}_i$. We then consider three models for each age group of immigrants:

1. Regress CatchUp_i on the usual covariates in X_i and linear YrsInUSA_i.[20] The coefficient estimate for YrsInUSA_i represents the total "acculturation effect."

2. Regress CatchUp_i on the usual covariates in X_i, linear YrsInUSA_i, and a set of characteristics from the NHANES dietary component.[21] The coefficient estimate for YrsInUSA_i now represents the total "acculturation effect" apart from observed nutrition. The percentage change in the coefficient from Model #1 above represents how much of the acculturation effect is explained by observable dietary habits.

3. Regress CatchUp_i on the usual covariates in X_i, linear YrsInUSA_i, and binary variables

[19] Fat, sugar, protein, and carbohydrate consumption are measured in grams.

[20] The "usual covariates" in X_i are the same variables as in Eq. (4.1): age, gender, race, health insurance status, marital status, smoking behavior, and work-related physical strain.

[21] These include binary indicators of whether dietary surveys were taken on weekend days (people tend to eat more on the weekend), whether the individual reports being on a diet, and logarithms of two-day person-specific averages of Calories, fat, protein, sugar, and carbohydrates (all in grams).

detailing leisure-related moderate or vigorous physical activity. The coefficient estimate for YrsInUSA_i now represents the total "acculturation effect" apart from observed exercise level. The percentage change in the coefficient from Model #1 above represents how much of the acculturation effect is explained by observable exercise habits.

Table B.9 contains the results. For the two younger age groups, additional years in the U.S. are associated with a smaller "catch-up size" - that is, a smaller difference in average native BMI and immigrant's own BMI. In other words, we continue to observe BMI convergence within the subsample including only immigrants. Years of residency estimates are insignificant for the oldest age group, echoing the previous result (Table B.3) that the catch-up is least prominent for that cohort. The addition of dietary controls decreases the main estimate from -.0816 to -.0674 from 20-34 year-olds and from -.0944 to -.0842 for 35-49 year-olds. This suggests that diet may explain at least 17% of the youngest immigrants' catch-up and at least 11% of the middle age group's catch-up. The addition of exercise controls has the opposite effect; holding exercise level constant reveals a *larger* acculturation effect. This suggests that immigrants may actually engage in more exercise as they continue to reside in the United States. In the previous models, the beneficial effects of more exercise may have been wrapped into the YrsInUSA_i indicator, counteracting to a small extent immigrants' deteriorating dietary habits. Regression results suggest that the exercise component is small, as YrsInUSA_i coefficients only increase by 8% and 1.7% for the younger two age groups, respectively. These findings conform to those of Henderson et al. (2008), which show that physical activity interventions are less effective for reducing obesity among adults and children.

The next subsection strives to further isolate these effects by exploring immigrants' changing dietary and physical activity habits via direct regressions with those characteristics on the left-hand-side.

5.2 Nutrition and Exercise

We adopt an OLS model similar to equation 4.1 to estimate models with various dependent variables that correspond to either nutritional intake or physical activity levels. We estimate nutritional models using data from our main sample of both natives and immigrants, differentiated by age group. They have the following specification:

$$\log(\text{Intake})_i = \alpha + \theta X_i + \psi_1 \text{Height}_i + \psi_2 \text{Height}_i^2 + \delta \text{Diet}_i + \gamma \text{Exercise}_i + \beta \text{YrsInUSA}_i + u_i \quad (5.1)$$

We estimate the model with four different dependent variables: Calories,[22] grams of fat, grams of protein, and grams of carbohydrates. X_i includes the same set of controls as in the main model. We control for height and its quadratic term because taller individuals likely consume more of all nutrients, regardless of their weight. Diet_i includes dichotomous indicators for whether individual i reported eating more than usual at both food intake interviews or less than usual (also at both interviews). Diet_i also includes binary indicators for whether both interviews took place on weekdays or on weekend days, as well as a dummy variable for reports of "currently being on a diet."[23] With Exercise_i, we control for individuals' leisure-related activity level, as more active individuals may naturally eat more.[24] Thus in these models, we interpret estimates of β as the acculturation-based changes in nutrient intake categories, holding constant typical personal characteristics, dietary anomalies, and exercise levels. Tables B.10 and B.11 present OLS regression results for the four versions of this model.[25]

Interpreting some of the relevant observables, height is associated with higher consumption of all four nutrient types–and increasingly so for taller individuals. Women tend to consume 17-32% fewer nutrients, depending on age group and nutrient category, and there is evidence that intake decreases with age (within age group). There is also evidence that the survey timing matters–many

[22]"Food calories" are typically written as capitalized "Calorie." This is the same as a kilocalorie, the amount of energy required to raise the temperature of 1 gram of water by 1° Celsius.

[23]The covariates in Diet_i are designed to help control for daily volatility in eating habits because dietary behavior may tend to differ substantially on a daily basis.

[24]Work-related activity level is contained in X_i as usual.

[25]Most coefficient estimates for X_i are not presented, for brevity.

of the volatility categories in Diet_i are significant with signs in the logical direction. Work-related physical activity (particular the "heavy" type) is largely associated with more nutrient consumption, ranging from about 7-13%. Estimates for leisure-related activity are smaller and generally less significant.

Our main interest is in the length-of-residency coefficients. On average, natives consume 5-10% more Calories per day than immigrants as well as 15% to 37% more grams of fat per day.[26] There is an upward trend in immigrants' intake of these two categories as their time in the U.S. increases, although it is most significant for fat consumption, particularly in the oldest age group. These "convergence coefficient" estimates range from .06-.47% increases with each additional year of U.S. residency. We do not observe similar trends in the regressions with protein and carbohydrate intake as dependent variables. Standard errors are notably larger and the signs of the immigration status coefficients vary seemingly randomly with age group and intake category. We conclude that increases in immigrants' caloric intake primarily stem from additional fat consumption, as other nutrient categories appear unchanged with respect to years of residency.

Lastly we estimate leisure-related physical activity models via maximum likelihood probit estimation on the pooled sample of immigrants and natives (stratified by age group):

$$\Phi(\text{Exercise}_i) = \alpha + \theta X_i + \psi_1 \text{Height}_i + \psi_2 \text{Height}_i^2 + \delta \text{Diet}_i + \beta \text{YrsInUSA}_i + u_i \tag{5.2}$$

We adopt two different forms of Exercise_i: a binary indicator equal to 1 for regular weekly vigorous exercise, and a binary indicator equal to 1 for either vigorous or moderate exercise (see Section 3 for details). As in Eq. (5.1), we control for height, height-squared, years of U.S. residency, and dietary information. In this case, Diet_i includes not only the day-of-the-week volatility characteristics, but also logarithms of five nutrient categories (Calories, fat, protein, sugar, carbohydrates). Results from these models (Table B.12) suggest that patterns in exercise behaviors are less predictable than eating habits, but it is clear that immigrants tend to exercise less than

[26] Although for Calories, the difference is not statistically significant for the youngest age group.

natives, particularly in the second category with joint vigorous and moderate activity levels. In this category, natives have a 41-57% higher chance of reporting moderate or vigorous activity than immigrants and that chance increases by 1-3% per each additional year of residency, depending on age group. Thus we have observed that immigrants' food intake—particularly of high fat foods—has moved towards natives' while their activity levels have concurrently improved. Together, these results imply that dietary changes are the main observable contributing factor to convergence of immigrants' BMI to natives' and that they are a strong enough force to overcome immigrants' increasing exercise levels.

6 Conclusion

This paper expands upon the existing literature on immigrant health–in particular on the weight, diet, and physical activity behavior of the immigrant population in the United States. Using data from the NHANES, we find strong evidence that immigrants enter the U.S. thinner than natives, but that their body mass index converges to natives' as their length of stay increases. This effect persists through a comprehensive set of control variables that are widely accepted in literature as "inputs" in a "production function of weight," and it is present for all income levels. Our analysis of nutrition and exercise suggests that immigrants' food choices — in particular their fat consumption — also follow "catch-up behavior." Their eating habits deteriorate enough to overcome marginally healthier exercise behaviors. These results suggest that policy interventions aimed at combating obesity may be best suited to focus on diet.

This study opens a number of possible avenues for future research. The acculturation effect of the "American diet" on immigrants serves as a natural experiment that may allow further study of the economic impact of such nutrition and resultant obesity levels. In the current economic discourse, issues surrounding health care costs are becoming increasingly important. It may be worthwhile to extend our analysis of weight-related variables to weight-related ailments and costs. The NHANES contains very specific information on nutrition intake; it may be advantageous to

study more specific changes in immigrants' diets in order to research the impact of variables like food prices and availability on choices. Immigrants are a sizable proportion of the U.S. population and the proportion of the foreign-born in expected to grow in the future decades. It would be interesting to study how immigrants can affect health care costs and provisions if they adopt the unhealthy eating practices of the majority populace. The "natural experiment" aspect of this question may allow us to extend many of our conclusions to the U.S. population as a whole.

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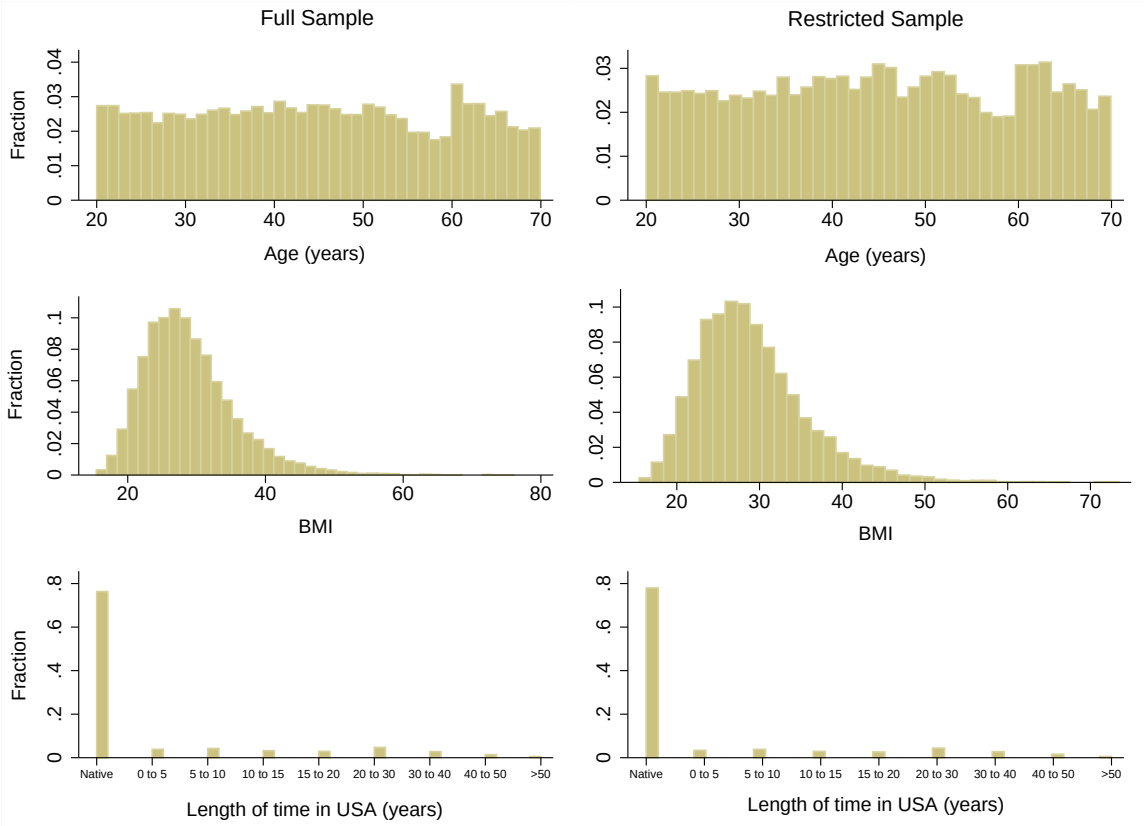
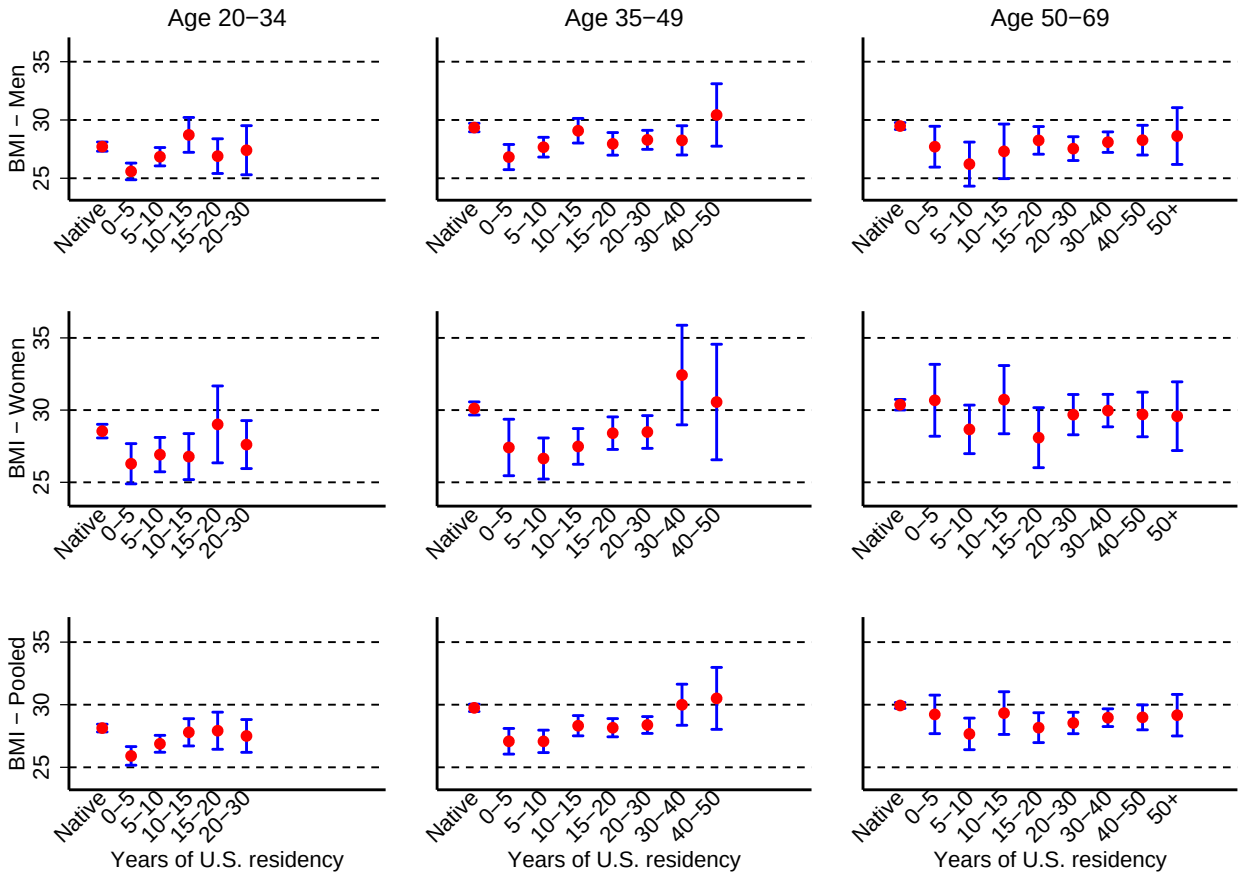
A Appendix: Figures

Figure A.1: Distributions for Reporting Bias Test



Note: The figures on the left column present the distributions of age, BMI, and immigration status from the full sample (which includes individuals who did not receive the medical examination nor the full dietary questionnaire). The figures on the right column present the distributions of these variables from the restricted sample (which is used for all empirical analyses).

Figure A.2: Average BMI Plots



Note: The figures above compare sample averages (points are marked by circles) and 95% confidence intervals of immigrants' BMI to the sample average of natives' BMI, grouped by age, gender, and length of stay in the United States.

B Appendix: Tables

Table B.1: Summary Statistics

	Natives		Immigrants	
	Mean	Std. Dev.	Mean	Std. Dev.
Female*	0.52	0.50	0.46	0.50
Age	43.8	13.8	41.0	12.3
BMI	28.8	6.8	27.1	5.2
Mexican*	0.04	0.20	0.34	0.47
Non-Mexican Hispanic*	0.01	0.11	0.19	0.39
Black*	0.13	0.33	0.06	0.24
White*	0.79	0.41	0.24	0.43
Other race*	0.03	0.17	0.18	0.38
Insured*	0.82	0.38	0.60	0.49
Married*	0.64	0.48	0.70	0.46
Never married*	0.20	0.40	0.18	0.39
Formerly married*	0.17	0.37	0.11	0.32
Education: less than 9th grade*	0.02	0.15	0.19	0.39
Education: some high school*	0.11	0.31	0.15	0.35
Education: high school grad. or GED*	0.26	0.44	0.18	0.39
Education: some college or Jr. college*	0.34	0.47	0.23	0.42
Education: college graduate or above*	0.27	0.45	0.24	0.43
Smoked but quit*	0.23	0.42	0.18	0.39
Smokes everyday*	0.23	0.42	0.13	0.34
Smokes occasionally*	0.04	0.20	0.05	0.23
Work intensity: sedentary*	0.64	0.48	0.69	0.46
Work intensity: moderate*	0.23	0.42	0.16	0.37
Work intensity: heavy*	0.13	0.34	0.15	0.35
Leisure activity: sedentary*	0.34	0.47	0.44	0.50
Leisure activity: moderate*	0.32	0.46	0.25	0.43
Leisure activity: vigorous*	0.35	0.48	0.31	0.46
Nutrition (per diem): Calories	2198	873	2062	806
Nutrition (per diem): Fat (gm)	85	40	71	36
Nutrition (per diem): Sugar (gm)	122	72	110	58
Nutrition (per diem): Protein (gm)	85	36	85	36
Nutrition (per diem): Carbohydrates (gm)	262	114	265	106
Nutrition: "on a diet"*	0.17	0.37	0.11	0.31
N	7,550		2,130	

Note: *Dummy or categorical variable; "mean" denotes sample proportion rather than sample mean.

Table B.2: Immigration Status Distribution (by age group)

	Age 20-34	Age 35-49	Age 50-69
Native	2,147	2,305	3,086
Fewer than 5 years in USA	195	85	47
5 to 10 years	213	101	54
10 to 15 years	111	118	49
15 to 20 years	66	140	51
20 to 30 years	58	209	157
30 to 40 years	10	67	190
40 to 50 years		36	117
More than 50 years			53
Total	2,800	3,061	3,804

Note: This table presents the number of natives and immigrants, grouped by how long they have lived in the U.S. and by three age groups.

Table B.3: Main Results - Pooled Sample

Dependent Variable: BMI	Age Group 20-29	Age Group 30-39	Age Group 40-49	Age Group 50-59	Age Group 60-69
Age	0.162*	-0.0168	-0.0804	0.0428	-0.0537
	(0.0901)	(0.0687)	(0.0617)	(0.0710)	(0.0791)
Female	0.562	-0.835**	-0.173	0.461	-0.743*
	(0.480)	(0.396)	(0.458)	(0.389)	(0.385)
Race/ethnicity (ref. group: non-Hispanic white)					
Mexican	1.775**	2.937***	0.889	1.798**	0.592
	(0.747)	(0.590)	(0.642)	(0.690)	(0.485)
Non-Mexican Hispanic	1.100	2.406**	2.223**	1.311*	0.956
	(0.704)	(1.161)	(0.910)	(0.761)	(0.901)
Black	2.647***	2.614***	1.526***	2.035***	1.287***
	(0.645)	(0.466)	(0.492)	(0.431)	(0.319)
Other race	-0.849	1.105	-0.113	0.295	-2.225*
	(0.826)	(0.805)	(0.875)	(0.947)	(1.243)
Cohort (ref. group: 2003-2004)					
Survey year 2005-2006	-0.393	0.800	0.783	0.940	0.988**
	(0.509)	(0.579)	(0.577)	(0.700)	(0.479)
Survey year 2007-2008	0.402	1.184*	0.109	1.239	0.705
	(0.548)	(0.637)	(0.383)	(0.758)	(0.420)
Education (ref. group: Bachelor's Degree or more)					
Less than 9th grade	1.992**	2.326**	1.031	2.435***	1.493**
	(0.902)	(1.014)	(0.724)	(0.590)	(0.730)
Some high school	3.199***	2.212***	1.726*	0.879	1.640**
	(1.000)	(0.799)	(0.876)	(0.846)	(0.700)
High school grad. or GED	2.360***	1.727***	1.818***	2.015***	1.669***
	(0.639)	(0.530)	(0.590)	(0.563)	(0.558)
Some college or A.A.	1.859***	1.538***	1.819***	1.656***	1.990***
	(0.457)	(0.517)	(0.566)	(0.598)	(0.495)
Family Income (ref. group: Highest quartile)					
Lowest quartile	0.293	1.503**	0.762	-0.593	0.702
	(0.744)	(0.719)	(0.728)	(0.654)	(0.794)
Second quartile	0.321	1.133	-0.0561	-0.0756	-0.160
	(0.651)	(0.741)	(0.476)	(0.628)	(0.538)
Third quartile	0.612	0.807	0.742	-0.839	0.401
	(0.565)	(0.508)	(0.516)	(0.521)	(0.583)
Refused/missing	-2.623***	2.771	0.0654	-0.658	0.720
	(0.947)	(2.356)	(1.308)	(1.358)	(0.920)
Insurance Status					
Insured	-0.452	1.574***	0.381	0.800	-0.453
	(0.619)	(0.477)	(0.559)	(0.585)	(0.614)
Insured missing	-0.324	-3.059	0.408	2.286	0.609
	(2.216)	(3.570)	(2.618)	(2.537)	(1.670)
Marital status (ref. group: Married)					
Never married	0.518	-0.381	0.203	0.732	0.753
	(0.574)	(0.519)	(0.742)	(0.916)	(1.104)
Formerly married	2.416*	-0.160	0.129	0.879*	-0.319
	(1.327)	(0.737)	(0.612)	(0.462)	(0.556)
Refused/missing	14.97***	-8.643***	-1.472	-4.986	
	(1.255)	(0.770)	(1.020)	(3.394)	
Smoking (ref. group: Never smoked)					
Smoked but quit	0.259	-0.112	0.244	0.354	-0.480
	(0.707)	(0.510)	(0.495)	(0.584)	(0.328)
Smokes everyday	-0.511	-1.076*	-1.845***	-2.560***	-3.318***
	(0.525)	(0.568)	(0.559)	(0.454)	(0.568)
Smokes occasionally	-0.600	-0.369	0.0991	-2.689***	-3.896***
	(0.672)	(0.643)	(1.077)	(0.899)	(0.987)
Work Intensity (ref. group: Sedentary)					
Moderate	0.267	-0.949*	-0.975*	-1.788***	-1.887***
	(0.512)	(0.495)	(0.534)	(0.448)	(0.370)
Heavy	0.0546	-0.691*	-1.099***	-1.047	-1.225
	(0.532)	(0.412)	(0.405)	(0.749)	(0.848)
Immigrant/native status					
Native	2.577***	4.358***	3.806***	3.906***	2.891**
	(0.857)	(0.688)	(0.667)	(1.022)	(1.184)
Years in USA	0.101**	0.0846**	0.0808**	0.0199	0.0222
	(0.0407)	(0.0334)	(0.0351)	(0.0269)	(0.0271)
Constant	17.68***	21.63***	27.49***	21.23***	30.12***
	(2.564)	(2.694)	(2.810)	(3.925)	(4.935)
Number of observations:	1868	1909	2084	1781	2023
R^2	0.076	0.090	0.063	0.083	0.091

$^{*}p < .10, ^{**}p < .05, ^{***}p < .01$

Table B.4: Main Results - Men only

Dependent Variable: BMI	Age Group 20-29	Age Group 30-39	Age Group 40-49	Age Group 50-59	Age Group 60-69
Age	0.176**	0.0798	-0.204***	0.0285	-0.121
	(0.0738)	(0.0848)	(0.0657)	(0.0786)	(0.0847)
Race/ethnicity (ref. group: non-Hispanic white)					
Mexican	1.928**	2.406***	0.324	0.189	0.116
	(0.791)	(0.854)	(0.832)	(0.798)	(0.726)
Non-Mexican Hispanic	1.560*	2.671	2.383**	0.849	0.265
	(0.837)	(1.733)	(0.902)	(0.959)	(0.975)
Black	1.518**	1.638***	0.215	0.462	-0.317
	(0.724)	(0.589)	(0.570)	(0.591)	(0.516)
Other race	-1.093	0.203	1.563	0.201	-2.551***
	(1.101)	(0.932)	(0.947)	(1.113)	(0.766)
Cohort (ref. group: 2003-2004)					
Survey year 2005-2006	-0.647	0.947*	0.774	0.577	0.214
	(0.626)	(0.517)	(0.641)	(0.627)	(0.563)
Survey year 2007-2008	-1.037*	1.344*	-0.0309	1.740**	0.577
	(0.602)	(0.683)	(0.664)	(0.723)	(0.606)
Education (ref. group: Bachelor's Degree or more)					
Less than 9th grade	0.585	0.721	0.976	2.781**	1.974**
	(1.207)	(1.292)	(1.088)	(1.172)	(0.967)
Some high school	1.010	1.101	1.087	0.857	1.570
	(1.025)	(1.064)	(1.108)	(1.007)	(1.090)
High school grad. or GED	0.631	1.893**	1.698**	1.767***	1.551**
	(0.986)	(0.747)	(0.682)	(0.638)	(0.700)
Some college or A.A.	0.533	0.943	1.369***	1.517**	2.435***
	(0.582)	(0.656)	(0.445)	(0.620)	(0.677)
Family Income (ref. group: Highest quartile)					
Lowest quartile	-0.375	-0.0238	-1.509**	-0.614	-0.319
	(0.984)	(0.808)	(0.662)	(0.703)	(1.056)
Second quartile	0.425	0.540	-0.612	0.255	-0.255
	(0.710)	(0.814)	(0.650)	(0.804)	(0.627)
Third quartile	0.715	0.147	-0.161	-0.671	0.626
	(0.599)	(0.671)	(0.635)	(0.536)	(0.517)
Refused/missing	-3.326***	-1.761	-0.183	-0.688	-0.420
	(1.129)	(1.336)	(0.838)	(1.557)	(0.780)
Insurance Status					
Insured	-0.478	1.210**	0.0478	0.532	-1.208
	(0.551)	(0.564)	(0.462)	(0.711)	(0.975)
Insured missing	1.432	1.627	3.138*	-3.262***	-1.615
	(3.545)	(3.004)	(1.652)	(1.204)	(1.430)
Marital status (ref. group: Married)					
Never married	0.0511	-0.663	-1.234	-1.779*	-2.476**
	(0.584)	(0.649)	(0.847)	(0.894)	(1.086)
Formerly married	0.348	-1.398	-1.244**	0.435	-0.431
	(1.120)	(0.919)	(0.602)	(0.653)	(0.609)
Refused/missing		-7.742***	-1.332	2.257**	
		(1.144)	(1.100)	(1.091)	
Smoking (ref. group: Never smoked)					
Smoked but quit	-1.062	-0.559	0.0872	-0.882	0.00353
	(0.886)	(0.621)	(0.560)	(0.576)	(0.477)
Smokes everyday	-1.040*	-1.668***	-1.699**	-2.724***	-2.454***
	(0.601)	(0.571)	(0.674)	(0.627)	(0.701)
Smokes occasionally	-1.638**	-1.213**	-0.183	-2.104*	-2.318*
	(0.755)	(0.595)	(1.217)	(1.070)	(1.306)
Work Intensity (ref. group: Sedentary)					
Moderate	0.678	-0.684	-0.769	-1.313**	-1.864***
	(0.831)	(0.691)	(0.504)	(0.496)	(0.528)
Heavy	0.401	-0.520	-1.013*	-1.189	-1.563
	(0.530)	(0.454)	(0.516)	(0.746)	(0.982)
Immigrant/native status					
Native	2.178**	4.004***	3.247***	2.155*	3.451**
	(0.916)	(1.089)	(0.738)	(1.172)	(1.396)
Years in USA	0.117**	0.0568	0.0637	0.00779	0.0232
	(0.0507)	(0.0408)	(0.0386)	(0.0316)	(0.0368)
Constant	20.36***	20.18***	35.17***	24.66***	34.89***
	(2.539)	(3.226)	(2.784)	(4.218)	(5.428)
Number of observations:	964	960	991	877	976
R^2	0.062	0.094	0.099	0.082	0.125

$^{*}p < .10, ^{**}p < .05, ^{***}p < .01$

Table B.5: Main Results - Women only

Dependent Variable: BMI	Age Group 20-29	Age Group 30-39	Age Group 40-49	Age Group 50-59	Age Group 60-69
Age	0.176	-0.111	0.0316	0.0760	0.0120
	(0.158)	(0.0806)	(0.0888)	(0.130)	(0.0964)
Race/ethnicity (ref. group: non-Hispanic white)					
Mexican	1.954	3.661***	1.819**	3.113***	1.028
	(1.227)	(1.017)	(0.861)	(1.014)	(0.652)
Non-Mexican Hispanic	1.072	2.082	2.214	1.663	1.164
	(1.329)	(1.284)	(1.409)	(1.396)	(1.286)
Black	3.704***	3.173***	2.252***	3.199***	2.301***
	(1.136)	(0.858)	(0.720)	(0.789)	(0.569)
Other race	-0.416	1.772	-1.412	0.464	-1.678
	(1.314)	(1.421)	(1.236)	(1.310)	(2.337)
Cohort (ref. group: 2003-2004)					
Survey year 2005-2006	-0.373	0.548	0.832	1.255	1.810**
	(0.815)	(0.866)	(0.874)	(0.874)	(0.749)
Survey year 2007-2008	1.588	0.651	0.276	0.828	1.080
	(0.989)	(0.772)	(0.730)	(0.843)	(0.675)
Education (ref. group: Bachelor's Degree or more)					
Less than 9th grade	1.730	3.706**	1.311	2.098	1.100
	(1.515)	(1.520)	(1.143)	(1.347)	(1.003)
Some high school	4.562**	2.815***	2.665**	1.287	1.483*
	(1.802)	(0.958)	(1.252)	(1.054)	(0.807)
High school grad. or GED	3.214***	1.260	2.053**	2.500***	1.452*
	(0.963)	(0.803)	(0.909)	(0.903)	(0.833)
Some college or A.A.	2.174***	1.655**	2.138**	2.086**	1.328
	(0.798)	(0.814)	(0.976)	(1.021)	(0.870)
Family Income (ref. group: Highest quartile)					
Lowest quartile	0.392	2.503**	2.455**	-0.0558	1.542
	(1.247)	(1.155)	(1.201)	(1.140)	(1.124)
Second quartile	0.255	1.820*	0.652	-0.387	0.204
	(1.056)	(0.985)	(0.724)	(0.934)	(0.937)
Third quartile	0.373	1.390**	1.869**	-1.068	0.269
	(0.956)	(0.689)	(0.834)	(0.947)	(1.038)
Refused/missing	-1.684	6.283**	0.287	-0.723	1.972
	(1.471)	(2.899)	(2.169)	(1.672)	(1.607)
Insurance Status					
Insured	-1.072	1.444**	0.652	0.961	0.0383
	(0.987)	(0.623)	(0.885)	(0.761)	(0.867)
Insured missing	-3.686		-2.256	4.054**	2.226
	(2.454)		(3.028)	(1.966)	(2.830)
Marital status (ref. group: Married)					
Never married	0.971	-0.0184	1.649	2.973*	3.385**
	(0.801)	(0.884)	(1.303)	(1.732)	(1.581)
Formerly married	3.131*	0.479	0.756	0.924	-0.310
	(1.710)	(0.979)	(0.778)	(0.966)	(0.818)
Refused/missing	12.36***			-9.010***	
	(2.383)			(1.411)	
Smoking (ref. group: Never smoked)					
Smoked but quit	1.634	0.702	0.0516	1.376	-0.753
	(1.231)	(0.830)	(0.727)	(0.907)	(0.479)
Smokes everyday	0.217	-0.205	-2.087**	-2.840***	-3.935***
	(0.799)	(0.875)	(0.779)	(0.788)	(0.890)
Smokes occasionally	0.219	1.508	1.029	-4.008**	-4.797***
	(1.325)	(1.394)	(2.131)	(1.732)	(1.278)
Work Intensity (ref. group: Sedentary)					
Moderate	0.0856	-0.984	-0.849	-2.338***	-1.962***
	(0.731)	(0.695)	(0.764)	(0.760)	(0.699)
Heavy	-0.116	0.406	-1.070	-0.712	-0.820
	(1.566)	(0.797)	(0.853)	(1.419)	(0.792)
Immigrant/native status					
Native	3.069**	4.497***	3.921***	5.550***	2.726
	(1.318)	(0.900)	(1.100)	(1.507)	(2.071)
Years in USA	0.0702	0.124**	0.0595	0.0362	0.0302
	(0.0829)	(0.0495)	(0.0564)	(0.0396)	(0.0463)
Constant	16.29***	22.96***	20.73***	17.54**	24.39***
	(4.283)	(3.138)	(4.127)	(7.196)	(6.141)
Number of observations:	904	949	1093	904	1047
R^2	0.125	0.143	0.101	0.117	0.111

$^{*}p < .10, ^{**}p < .05, ^{***}p < .01$

Table B.6: Main Results - Pooled Sample -Years in U.S. Dichotomization

Dependent Variable: BMI	Age Group 20-34	Age Group 35-49	Age Group 50-69
Age	0.196***	0.00921	-0.0174
	(0.0437)	(0.0418)	(0.0252)
Female	0.415	-0.594*	0.00192
	(0.334)	(0.343)	(0.279)
Race/ethnicity (ref. group: non-Hispanic white)			
Mexican	1.916***	1.996***	1.509***
	(0.488)	(0.521)	(0.422)
Non-Mexican Hispanic	1.227	2.617***	1.249*
	(0.751)	(0.706)	(0.658)
Black	2.295***	2.098***	1.736***
	(0.482)	(0.400)	(0.332)
Other race	-0.951	0.660	-0.410
	(0.655)	(0.537)	(0.840)
Cohort (ref. group: 2003-2004)			
Survey year 2005-2006	0.0856	0.686	0.938**
	(0.486)	(0.520)	(0.458)
Survey year 2007-2008	0.532	0.490	1.061**
	(0.503)	(0.412)	(0.499)
Education (ref. group: Bachelor's Degree or more)			
Less than 9th grade	2.315***	1.113	1.988***
	(0.722)	(0.686)	(0.535)
Some high school	2.672***	2.212***	1.175*
	(0.740)	(0.677)	(0.635)
High school grad. or GED	2.047***	1.932***	1.849***
	(0.515)	(0.532)	(0.453)
Some college or A.A.	1.677***	1.757***	1.757***
	(0.441)	(0.434)	(0.397)
Family Income (ref. group: Highest quartile)			
Lowest quartile	0.360	1.066	-0.0577
	(0.586)	(0.670)	(0.566)
Second quartile	0.240	0.616	-0.228
	(0.578)	(0.500)	(0.460)
Third quartile	0.585	0.788*	-0.324
	(0.478)	(0.464)	(0.387)
Refused/missing	-2.009**	1.061	-0.0658
	(0.929)	(1.454)	(0.937)
Insurance Status			
Insured	0.0582	0.788*	0.348
	(0.499)	(0.466)	(0.491)
Insured missing	-0.274	0.349	1.892
	(1.913)	(2.412)	(1.449)
Marital status (ref. group: Married)			
Never married	0.466	-0.406	0.532
	(0.479)	(0.534)	(0.710)
Formerly married	0.918	0.0899	0.311
	(0.848)	(0.478)	(0.344)
Refused/missing	15.88***	-2.474**	-5.727
	(1.013)	(0.988)	(3.647)
Smoking (ref. group: Never smoked)			
Smoked but quit	-0.440	0.418	0.0522
	(0.579)	(0.382)	(0.366)
Smokes everyday	-1.134***	-1.412***	-2.852***
	(0.420)	(0.408)	(0.362)
Smokes occasionally	-1.023*	0.393	-3.122***
	(0.521)	(0.682)	(0.642)
Work Intensity (ref. group: Sedentary)			
Moderate	0.0634	-1.127**	-1.842***
	(0.394)	(0.450)	(0.279)
Heavy	0.210	-1.461***	-1.118*
	(0.570)	(0.298)	(0.662)
Years of residency (ref. group: Native)			
Less than 5yrs	-2.381***	-4.639***	-2.921**
	(0.607)	(0.605)	(1.158)
5 to 10yrs	-2.343***	-3.175***	-5.080***
	(0.726)	(0.608)	(1.170)
10 to 15yrs	-2.211***	-1.964***	-2.417
	(0.822)	(0.600)	(1.547)
15 to 20yrs	-1.120	-2.986***	-3.538***
	(1.238)	(0.548)	(0.664)
20 to 30yrs	-0.890	-3.209***	-2.858***
	(0.645)	(0.561)	(0.880)
30 to 40yrs	0.0996	-1.401	-3.891***
	(2.176)	(0.851)	(0.749)
40 to 50yrs		1.131	-1.896*
		(1.689)	(0.972)
More than 50yrs			-1.952**
			(0.857)
Constant	19.68***	26.52***	29.27***
	(1.218)	(1.829)	(1.696)
Number of observations:	2800	3061	3804
R^2	0.072	0.075	0.078
F-test: Joint significance of "Years in USA" dummies	4.11	13.82	7.35
F-test: Joint equality of "Years in USA" dummies	1.86	2.83	1.35

$^{*}p < .10, ^{**}p < .05, ^{***}p < .01$

Table B.7: Robustness Check - BMI Changes

Dependent Variable:	ΔBMI - Exam	ΔBMI - Exam	ΔBMI - Self	ΔBMI - Self
Age	-0.0445**	-0.0429*	-0.0285	-0.0272
	(0.0220)	(0.0219)	(0.0183)	(0.0182)
Age^2	0.000422*	0.000405	0.000126	0.000112
	(0.000249)	(0.000248)	(0.000209)	(0.000209)
Female	0.453***	0.451***	0.0884	0.0871
	(0.0776)	(0.0781)	(0.0644)	(0.0646)
Education (ref. group: Bachelor's Degree or more)				
Less than 9th grade	-0.444*	-0.436*	-0.135	-0.118
	(0.228)	(0.229)	(0.152)	(0.151)
Some high school	0.428**	0.426**	0.412**	0.416**
	(0.181)	(0.181)	(0.163)	(0.163)
High school grad. or GED	0.236*	0.235*	0.192*	0.192*
	(0.124)	(0.123)	(0.0974)	(0.0974)
Some college or A.A.	0.231**	0.235**	0.0433	0.0470
	(0.112)	(0.112)	(0.0853)	(0.0859)
Family Income (ref. group: Highest quartile)				
Lowest quartile	0.283*	0.284*	0.223*	0.216*
	(0.150)	(0.149)	(0.117)	(0.117)
Second quartile	-0.103	-0.100	-0.0496	-0.0548
	(0.126)	(0.126)	(0.118)	(0.119)
Third quartile	0.0976	0.104	0.0314	0.0326
	(0.107)	(0.106)	(0.0748)	(0.0743)
Refused/missing	0.390	0.378	0.334	0.327
	(0.365)	(0.361)	(0.266)	(0.264)
Smoking (ref. group: Never smoked)				
Smoked but quit	0.0405	0.0415	-0.00668	-0.00679
	(0.113)	(0.113)	(0.0844)	(0.0851)
Smokes everyday	-0.285**	-0.285**	-0.105	-0.106
	(0.123)	(0.123)	(0.122)	(0.122)
Smokes occasionally	0.134	0.131	0.121	0.122
	(0.166)	(0.165)	(0.114)	(0.113)
Work Intensity (ref. group: Sedentary)				
Moderate	-0.252**	-0.253**	-0.198**	-0.198**
	(0.111)	(0.111)	(0.0972)	(0.0966)
Heavy	0.0103	0.0107	-0.0830	-0.0807
	(0.110)	(0.110)	(0.110)	(0.110)
Immigrant/native status				
Native	-0.269	ref. group	-0.123	ref. group
	(0.186)		(0.141)	
Years in USA (linear form)	0.00301		0.00471	
	(0.00670)		(0.00586)	
Less than 5yrs		0.217		0.295*
		(0.204)		(0.175)
5 to 10yrs		0.623***		0.294*
		(0.229)		(0.160)
10 to 15yrs		0.150		-0.127
		(0.311)		(0.244)
15 to 20yrs		0.393		0.301
		(0.307)		(0.185)
20 to 30yrs		0.0794		0.0523
		(0.218)		(0.164)
30 to 40yrs		0.366		0.302
		(0.229)		(0.207)
40 to 50yrs		0.543*		0.437
		(0.288)		(0.272)
More than 50yrs		0.864		0.844
		(0.893)		(0.747)
Constant	1.430***	1.123**	0.979***	0.831**
	(0.407)	(0.429)	(0.358)	(0.353)
Number of observations:	9364	9364	9331	9331
R^2	0.019	0.020	0.015	0.016
F-test: Joint significance of "Years in USA" dummies		1.69		1.08

$^{*}p < .10, ^{**}p < .05, ^{***}p < .01$

Table B.8: Income Stratification Tests

	Lowest Income Quartile			2nd Income Quartile			3rd Income Quartile			Highest Income Quartile		
Men only, age group:	20-34	35-49	50-69	20-34	35-49	50-69	20-34	35-49	50-69	20-34	35-49	50-69
Natives	3.141**	3.647**	3.396	2.835**	6.227***	5.579***	0.0296	1.441	1.931	2.075	4.168***	3.213*
	(1.356)	(1.685)	(2.241)	(1.340)	(1.554)	(1.858)	(2.157)	(1.237)	(1.751)	(1.680)	(0.784)	(1.930)
Years in USA	0.292**	0.0812	0.00609	-0.0528	0.0922*	0.0838**	0.0177	0.00770	-0.00469	0.0327	0.0639*	0.0317
	(0.113)	(0.0631)	(0.0547)	(0.122)	(0.0517)	(0.0420)	(0.0970)	(0.0572)	(0.0527)	(0.0719)	(0.0370)	(0.0441)
Number of Obs.:	370	267	396	325	283	364	357	373	407	315	545	628
R^2	0.134	0.207	0.156	0.154	0.271	0.105	0.111	0.117	0.214	0.147	0.090	0.104
Women only, age group:	20-34	35-49	50-69	20-34	35-49	50-69	20-34	35-49	50-69	20-34	35-49	50-69
Natives	0.712	4.645*	4.609***	3.795**	5.885***	2.943	5.106***	7.834***	7.173***	4.058**	2.414**	5.212**
	(1.987)	(2.650)	(1.618)	(1.731)	(1.884)	(2.664)	(1.794)	(1.589)	(2.027)	(2.038)	(1.210)	(2.618)
Years in USA	-0.122	0.0822	0.0468	0.0108	0.176*	0.0366	0.227**	0.0722	0.126*	0.107	0.129	-0.0186
	(0.139)	(0.0861)	(0.0393)	(0.109)	(0.105)	(0.0520)	(0.0906)	(0.0661)	(0.0730)	(0.104)	(0.0797)	(0.0552)
Number of Obs.:	394	347	476	310	300	402	329	347	494	319	536	511
R^2	0.116	0.168	0.241	0.191	0.149	0.105	0.252	0.154	0.129	0.143	0.202	0.138

Note: $^{*}p < .10, ^{**}p < .05, ^{***}p < .01$. This table presents coefficient estimates of the immigration status indicators from the main model stratified by income quartile and gender. The OLS specifications included the following additional regressors (not presented above): age, race, survey cohort, education, family income quartile, health insurance status, marital status, smoking behavior, work intensity, and a constant term.

Table B.9: Regression Decomposition

	Age Group 20-34			Age Group 35-49			Age Group 50-69		
Dependent Variable: CatchUp$_i$	Baseline	w/ Diet	w/ Exercise	Baseline	w/ Diet	w/ Exercise	Baseline	w/ Diet	w/ Exercise
Years in USA (linear form)	-0.0816**	-0.0674**	-0.0883**	-0.0944***	-0.0842***	-0.0960***	0.00132	0.0145	-0.00259
	(0.0345)	(0.0329)	(0.0360)	(0.0241)	(0.0198)	(0.0249)	(0.0210)	(0.0206)	(0.0214)
Dietary Information									
Both survey days on wknd.		-2.380*			-1.752**			2.232***	
		(1.262)			(0.881)			(0.760)	
Neither survey day on wknd.		0.798			0.0370			-0.894	
		(0.510)			(0.461)			(0.543)	
Reported ate more than usual		0.291			-0.320			-1.259*	
		(0.755)			(0.535)			(0.731)	
Reported ate less than usual		-0.468			-1.014*			-0.688	
		(0.597)			(0.607)			(0.661)	
Reported "on a diet"		-1.422**			-2.952***			-1.320**	
		(0.653)			(1.091)			(0.671)	
log(Calories per day)		-5.750			5.940*			4.316	
		(4.246)			(3.462)			(5.852)	
log(grams of fat per day)		-0.251			-0.664			-2.338	
		(1.404)			(1.326)			(1.663)	
log(grams of protein per day)		2.302*			-3.314***			0.0690	
		(1.249)			(1.037)			(1.665)	
log(grams of sugar per day)		-0.484			1.715			-1.483*	
		(0.742)			(1.093)			(0.863)	
log(grams of carbohydrates per day)		4.095			-5.122**			1.732	
		(2.538)			(2.366)			(3.595)	
Leisure-time physical activity (ref. group: none)									
Moderate			0.401			0.142			0.853
			(0.679)			(0.693)			(0.682)
Vigorous			0.895			1.685***			1.077
			(0.590)			(0.580)			(0.815)
Number of observations:	653	653	653	756	756	756	718	718	718
R^2	0.205	0.247	0.209	0.154	0.225	0.173	0.214	0.278	0.220

Note: $^{*}p < .10$,** $p < .05$,*** $p < .01$. This table presents coefficient estimates of the years of residency linear indicator for the subsample of immigrants and how those estimates change as dietary and physical activity controls are added. The OLS specifications also included the "typical" set of controls used previously (not presented above for brevity): age, race, survey cohort, education, family income quartile, health insurance status, marital status, smoking behavior, occupation-related intensity, and a constant term.

Table B.10: Nutritional Results - Calories and Fat

Dependent Variable:	log(Calories per day)			log(Grams of fat per day)		
Age group:	20-34	35-49	50-69	20-34	35-49	50-69
Height	-3.580*	-3.675*	-3.664**	-3.961	-6.090**	-4.923**
	(1.971)	(2.210)	(1.648)	(2.686)	(2.766)	(2.228)
Height^2	1.204**	1.203*	1.243**	1.358*	1.932**	1.617**
	(0.568)	(0.642)	(0.482)	(0.769)	(0.804)	(0.651)
Age	0.000869	-0.000999	-0.00742***	0.00435	-0.000438	-0.00853***
	(0.00246)	(0.00204)	(0.00140)	(0.00350)	(0.00258)	(0.00189)
Female	-0.271***	-0.283***	-0.221***	-0.243***	-0.269***	-0.232***
	(0.0247)	(0.0266)	(0.0211)	(0.0327)	(0.0313)	(0.0272)
Dietary Controls						
Both survey days on wknd.	-0.00525	-0.0159	0.130**	-0.0112	-0.0190	0.116
	(0.0358)	(0.0377)	(0.0538)	(0.0470)	(0.0459)	(0.0716)
Neither survey day on wknd.	-0.0229	-0.0234	0.00328	-0.0295	-0.0282	-0.0233
	(0.0190)	(0.0179)	(0.0153)	(0.0260)	(0.0222)	(0.0202)
Reported ate more than usual	0.0136	0.0613**	0.0932***	0.0281	0.0875***	0.119***
	(0.0316)	(0.0257)	(0.0201)	(0.0388)	(0.0309)	(0.0292)
Reported ate less than usual	-0.0720***	-0.108***	-0.0808***	-0.107***	-0.110***	-0.106***
	(0.0230)	(0.0224)	(0.0212)	(0.0325)	(0.0273)	(0.0267)
Reported "on a diet"	-0.125***	-0.136***	-0.0927***	-0.110**	-0.135***	-0.0943***
	(0.0303)	(0.0274)	(0.0195)	(0.0444)	(0.0344)	(0.0262)
Work Intensity (ref. group: Sedentary)						
Moderate	0.0304	0.0446**	0.0251	0.0286	0.0271	0.0153
	(0.0230)	(0.0213)	(0.0189)	(0.0304)	(0.0264)	(0.0252)
Heavy	0.0940***	0.128***	0.0689**	0.102***	0.110***	0.0487
	(0.0260)	(0.0251)	(0.0291)	(0.0334)	(0.0290)	(0.0359)
Leisure-time physical activity (ref. group: none)						
Moderate activity	-0.0393	0.0221	0.00492	-0.0253	0.0371	-0.0259
	(0.0258)	(0.0227)	(0.0179)	(0.0337)	(0.0280)	(0.0229)
Vigorous activity	-0.0182	0.0587***	-0.0106	-0.0366	0.0648**	-0.0682**
	(0.0224)	(0.0222)	(0.0222)	(0.0299)	(0.0289)	(0.0291)
Immigrant/native status						
Native	0.0545	0.103**	0.0929*	0.154***	0.232***	0.371***
	(0.0391)	(0.0483)	(0.0480)	(0.0510)	(0.0642)	(0.0698)
Years in USA	-0.00119	0.00176	0.000555	0.000274	0.00319	0.00474***
	(0.00232)	(0.00160)	(0.00130)	(0.00311)	(0.00222)	(0.00184)
Number of observations:	2723	3010	3732	2723	3010	3732
R^2	0.275	0.279	0.264	0.202	0.228	0.214

Note: $^{*}p < .10, ^{**}p < .05, ^{***}p < .01$. This table presents partial regression results from the nutritional regressions of Eq. (5.1). The OLS specifications included the following additional regressors (not presented above): race, survey cohort, education, family income quartile, health insurance status, marital status, smoking habits, and a constant term. The sample size is slightly reduced compared to previous models due to non-reports of height (this control was not needed in previous models).

Table B.11: Nutritional Results - Protein and Carbohydrates

Dependent Variable:	log(Grams of Protein per day)			log(Grams of Carbs per day)		
Age group:	20-34	35-49	50-69	20-34	35-49	50-69
Height	-4.083*	-1.645	-3.299	-2.783	-7.332***	-4.445**
	(2.231)	(2.582)	(2.087)	(2.292)	(2.436)	(1.758)
Height^2	1.321**	0.567	1.145*	0.975	2.270***	1.434***
	(0.649)	(0.753)	(0.613)	(0.654)	(0.710)	(0.513)
Age	-0.00405	-0.00330	-0.00593***	0.00824***	-0.000242	-0.00572***
	(0.00269)	(0.00231)	(0.00150)	(0.00274)	(0.00235)	(0.00162)
Female	-0.251***	-0.265***	-0.170***	-0.317***	-0.310***	-0.225***
	(0.0274)	(0.0298)	(0.0242)	(0.0287)	(0.0309)	(0.0229)
Dietary Controls						
Both survey days on wknd.	0.0153	-0.0346	0.160***	-0.0185	-0.00575	0.0757
	(0.0404)	(0.0393)	(0.0594)	(0.0395)	(0.0376)	(0.0651)
Neither survey day on wknd.	-0.00213	-0.00822	0.0316*	-0.0354	-0.0116	-0.0166
	(0.0210)	(0.0205)	(0.0176)	(0.0219)	(0.0205)	(0.0165)
Reported ate more than usual	0.0102	0.0483*	0.0857***	0.00826	0.0587*	0.0656***
	(0.0340)	(0.0290)	(0.0229)	(0.0336)	(0.0304)	(0.0225)
Reported ate less than usual	-0.0299	-0.0844***	-0.0528**	-0.122***	-0.159***	-0.137***
	(0.0248)	(0.0256)	(0.0240)	(0.0263)	(0.0261)	(0.0239)
Reported "on a diet"	-0.188***	-0.183***	-0.124***	-0.0342	-0.0182	0.0125
	(0.0328)	(0.0322)	(0.0225)	(0.0354)	(0.0300)	(0.0216)
Work Intensity (ref. group: Sedentary)						
Moderate	0.0181	0.0583**	0.0385*	0.0447*	0.0352	0.0276
	(0.0249)	(0.0242)	(0.0219)	(0.0247)	(0.0252)	(0.0193)
Heavy	0.0822***	0.130***	0.0919***	0.0906***	0.0843***	0.0428
	(0.0307)	(0.0292)	(0.0300)	(0.0293)	(0.0294)	(0.0323)
Leisure-time physical activity (ref. group: none)						
Moderate	-0.0397	0.00998	0.0169	-0.0322	0.0314	0.0286
	(0.0289)	(0.0253)	(0.0207)	(0.0278)	(0.0256)	(0.0192)
Vigorous	-0.0325	0.0499**	0.0355	0.0103	0.101***	0.00168
	(0.0248)	(0.0249)	(0.0247)	(0.0248)	(0.0255)	(0.0243)
Immigrant/native status						
Native	-0.0218	0.00268	-0.0571	0.0205	0.0359	0.0262
	(0.0456)	(0.0512)	(0.0529)	(0.0413)	(0.0531)	(0.0582)
Years in USA	-0.00302	0.000194	-0.00238	-0.00120	0.000882	0.000971
	(0.00274)	(0.00169)	(0.00152)	(0.00255)	(0.00192)	(0.00162)
Number of observations:	2723	3010	3732	2723	3010	3732
R^2	0.204	0.205	0.182	0.273	0.256	0.220

Note: $^{*}p < .10,^{**}p < .05,^{***}p < .01$. This table presents partial regression results from the nutritional regressions of Eq. (5.1). The OLS specifications included the following additional regressors (not presented above): race, survey cohort, education, family income quartile, health insurance status, marital status, smoking habits, and a constant term. The sample size is slightly reduced compared to previous models due to non-reports of height (this control was not needed in previous models).

Table B.12: Physical Activity Results

Dependent Variable:	Φ (Vigorous Activity)			Φ (Mod. Or Vig. Activity)		
Age group:	20-34	35-49	50-69	20-34	35-49	50-69
Height	1.708	1.965	2.557	8.552	-0.676	2.411
	(8.669)	(9.918)	(8.989)	(8.968)	(8.705)	(7.524)
Height^2	-0.394	-0.720	-0.896	-2.430	-0.0450	-0.607
	(2.506)	(2.896)	(2.632)	(2.604)	(2.551)	(2.203)
Age	-0.0434***	-0.0274***	-0.0333***	-0.0388***	-0.0152**	-0.00490
	(0.00884)	(0.00825)	(0.00679)	(0.00890)	(0.00777)	(0.00557)
Female	-0.213**	-0.131	-0.422***	-0.102	0.0505	-0.0694
	(0.105)	(0.103)	(0.112)	(0.110)	(0.0995)	(0.0997)
Dietary Controls						
Both survey days on wknd.	-0.0596	0.199	-0.131	0.0918	0.0319	-0.0922
	(0.148)	(0.158)	(0.247)	(0.146)	(0.153)	(0.188)
Neither survey day on wknd.	0.0613	0.0397	-0.0287	0.0772	0.0884	0.0811
	(0.0716)	(0.0718)	(0.0723)	(0.0759)	(0.0694)	(0.0636)
Reported ate more than usual	-0.149	0.143	-0.0417	-0.0715	0.0833	0.0449
	(0.118)	(0.101)	(0.119)	(0.130)	(0.104)	(0.103)
Reported ate less than usual	-0.183**	0.00948	-0.0726	-0.146*	-0.124	-0.0339
	(0.0808)	(0.0861)	(0.0928)	(0.0836)	(0.0833)	(0.0793)
Reported "on a diet"	0.201*	0.0609	0.0647	0.274***	0.276***	0.0401
	(0.107)	(0.106)	(0.0887)	(0.105)	(0.105)	(0.0825)
log(Calories per day)	1.242**	-0.612	-0.580	0.165	-0.136	0.0130
	(0.494)	(0.471)	(0.517)	(0.532)	(0.390)	(0.432)
log(grams of fat per day)	-0.636***	-0.00161	-0.119	-0.152	0.00591	-0.432**
	(0.184)	(0.207)	(0.205)	(0.196)	(0.175)	(0.171)
log(grams of protein per day)	0.140	0.575***	0.194	0.0993	0.283*	0.345**
	(0.164)	(0.170)	(0.177)	(0.166)	(0.146)	(0.148)
log(grams of sugar per day)	0.0123	-0.0956	-0.0111	0.00297	-0.0418	-0.0222
	(0.120)	(0.113)	(0.116)	(0.121)	(0.106)	(0.0958)
log(grams of carbohydrates per day)	-0.665**	0.466	0.537*	-0.223	0.101	0.232
	(0.320)	(0.292)	(0.304)	(0.342)	(0.268)	(0.255)
Work Intensity (ref. group: Sedentary)						
Moderate	0.0632	0.258***	0.266***	0.153*	0.408***	0.328***
	(0.0855)	(0.0876)	(0.0878)	(0.0876)	(0.0881)	(0.0811)
Heavy	0.189*	0.243**	0.337**	0.207*	0.349***	0.230**
	(0.103)	(0.101)	(0.134)	(0.106)	(0.0982)	(0.115)
Immigrant/native status						
Native	0.240	0.0741	0.334	0.565***	0.409**	0.481**
	(0.161)	(0.188)	(0.261)	(0.160)	(0.178)	(0.221)
Years in USA	0.0111	0.00293	0.00334	0.0300***	0.0168***	0.0101
	(0.0108)	(0.00719)	(0.00675)	(0.00980)	(0.00648)	(0.00632)
Number of observations:	2723	3010	3732	2723	3010	3732

Note: $^{*}p < .10,^{**}p < .05,^{***}p < .01$. This table presents partial regression results from the physical activity models of Eq. (5.2). Estimation was performed via maximum likelihood on probit models, and the coefficients presented above are marginal effects (i.e. the change in the probability for an infinitesimal change in each continuous independent variable–or the discrete change in the probability for dummy variables). The probit specifications included the following additional regressors (not presented above): race, survey cohort, education, family income quartile, health insurance status, marital status, smoking habits, and a constant term. The sample size is slightly reduced compared to previous models due to non-reports of height (this control was not needed in previous models).