

Variance in Obesity across Cohorts and Countries: A Norms-Based Explanation using Happiness Surveys

Obesity is increasingly recognized as a public health problem in the United States and many other countries. While estimates of the extent of the problem vary, there is no doubt that obesity has increased dramatically in the past two decades. In 2000, roughly 30% of Americans were classified as obese, defined as having a body mass index (BMI) of 30 or over; this is over twice the percentage of 1970.¹ There are significant public health costs related to that increase, due to the strong links between obesity and diabetes, high blood pressure, and high cholesterol.² A related and particularly tragic problem is the increased incidence in childhood obesity, which has implications for children's health, self-esteem, and future longevity.³

Most of the research and public policy recommendations focus on what we might call the "supply" side of obesity: the increasing availability of cheap, unhealthy food and the decline of exercise. That is certainly a central part of the phenomenon, at least in the U.S., where the upward trends are starkest of any country. Yet the changes are not the same across socioeconomic cohorts and racial groups in the U.S.⁴ Indeed, most of the increases are in the right tail of the weight distribution – in other words, heavier people getting heavier – and in the lower end of the income distribution – among poor people. While more recent evidence suggests some increase in overweight and obesity among wealthier cohorts, the incidence of extreme obesity and related morbidity and mortality is still much higher for the poor than for wealthier cohorts.⁵

¹ The standard definition of BMI is based on a weight to height ratio, in metric units: BMI= kg/m². G.A. Bray, C. Bouchard, and W.P.T James, ed., *Handbook of Obesity* (New York: Marcel Dekker Inc.). For recent trends in the U.S., see David M. Cutler, Edward Glaeser, and David Shapiro, "Why Have Americans Become More Obese?" *Journal of Economic Perspectives*, Vol. 17, 2003.

² There is some debate over whether the health costs are equally high for the entire obese population or just those that are extremely obese (a group constituting 8% of Americans). The most recent study on the topic was conducted by the National Cancer Institute and the Centers for Disease Control and Prevention, and reported in the April 20 edition of the *Journal of the American Medical Association*. For a report on the debate, see Gina Kolata, "Some Extra Heft May Be Helpful", *The New York Times*, April 20, 2005. For documentation of the health consequences of severe overweight, based on a panel of 12,000 adults in the Netherlands, see T.S. Han, M. Tijhuis, M.E. Lean, and J.C. Seidell, "Quality of Life in Relation to Overweight and Body Fat Distribution", *American Journal of Public Health*, Vol. 88, No.12, December 1998.

³ Children between ages 2 and 17 are rarely classified as obese; instead, those with a body mass index that is equal to or greater than the 95th percentile are qualified as overweight. While 5% of children were overweight in the 1976-1980 round of the National Health and Nutrition Examination Survey, 14% were in the 1999-2000 round. For an excellent summary of trends in childhood obesity, see the papers from a forthcoming edition of the Brookings-Princeton journal *The Future of Children*, edited by Christina Paxson. Meanwhile, the papers are available at <http://www.futureofchildren.princeton.edu/obesity/drafts.asp>.

⁴ Obesity trends in France and Germany demonstrate a similar pattern, with the largest increases in the lowest socioeconomic cohorts, and increases in the upper socioeconomic cohorts only among those individuals who were already overweight. See A. Lamerz et al., "Social Class, Parental Education, and Obesity Prevalence in a Study of Six Year Old Children in Germany", *International Journal of Obesity*, Vol.29, No.4 (2005); and M. Romon et al., "Influence of Social Class on Time Trends in BMI Distribution in 5 Year old French Children from 1989-1999", *International Journal of Obesity*, Vol. 29, No.1, (2005). Our initial evidence from Russia suggests that trends are much more evenly spread across socioeconomic classes, meanwhile, and that obesity is more prevalent among wealthier individuals than poorer ones.

⁵ See, among others, Mary Burke and Frank Heiland, "Social Dynamics of Obesity", Center on Social and Economic Dynamics Working Paper Series, No. 38, The Brookings Institution, May 2005. Analysis of changes in BMI values in our own sample of respondents in the National Longitudinal Survey of Youth

If the increase in obesity is merely a story about cheap food and sedentary lifestyles, why is there variance across socioeconomic cohorts? Why also did it not occur earlier? The upward trends in obesity occurred primarily between 1971 and 2001. Yet television was widely available well before 1971, and cable television was available by 1990, making it unlikely that the mere availability of television can explain the trend. Likewise, fast food was also widely available prior to the major increases in overweight.⁶ Some of the change must be coming from the “demand” side as well.

Public policy is heavily tilted towards the provision of more and better public information on the benefits of healthy eating habits and exercise. Yet the variance in trends suggests that some cohorts may be much more receptive and responsive to these public health messages than others, for any number of reasons. For example, there is significant evidence that self-control problems have a role: Americans spend \$30-50 billion annually on diets.⁷ Consumption and sedentary lifestyles no doubt matter, but something else must also be at play.

There are a number of plausible explanations, in addition to the standard consumption plus exercise ones, that could explain the variance in incidence of obesity across socioeconomic and racial cohorts. Our empirical analysis focuses on the potential role of differences in norms and expectations in explaining this variance. These are two distinct explanations which likely complement each other but may also vary in their importance across particular cohorts, as our results (below) suggest.

We posit that it may be more acceptable to be overweight in some socioeconomic cohorts than in others. If norms are different across cohorts, then the well-being “costs” of being obese – e.g. stigma - will also differ. For example, the obese (and women in particular) seem to suffer wage discrimination in “high-end” jobs but not “low-end” jobs. This may reflect differences in norms about acceptable weights across socioeconomic cohorts and professions.⁸

One reason for better understanding norms and expectations is that the impact of public health messages may vary if expectations are different across cohorts. If there is great uncertainty about the future – both in health and in other terms – among certain cohorts, then their incentives to adhere to public health warnings, and to delay consumption for future benefit, will be lower. In economic terms, the discount rate (e.g. the cost of postponing consumption) of these cohorts will be higher. People with high levels of uncertainty and low expectations have less incentive to save for the future. Similarly, they may be less inclined to delay consumption and pursue healthy lifestyles as an investment in their future. Incentives will be even lower if conforming to such messages is not the norm for one’s cohort.

from 1979-1997, meanwhile, concurs with this. We find that the greatest increases in BMI are among blacks, Hispanics, lower income respondents, and those in lower status occupations. Results are available from the authors. The initial evidence of some increase in wealthier cohorts, meanwhile, comes from an unpublished survey reported in: http://www.cbsnews.com/stories/2005/05/03/earlyshow/health/health_news/main692614.stml.

⁶ The dates are based on rounds that the National Health and Nutrition Examination Surveys (NHANES) were conducted. See Patricia M. Anderson, Kristin Butcher, and Phillip Levine, “Economic Perspectives on Childhood Obesity”, *Economic Perspectives*, Chicago Federal Reserve Bank, 3Q, 2003.

⁷ See Cutler and Glaeser (2003).

⁸ This paper is based on U.S. data for employer insured versus non-insured workers. The former category of jobs are typically more stable, higher productivity, and higher paying than the latter. The same paper finds that the obese sort into low end jobs in the high end market. See Jay Battacharya and M. Kate Bundorf, “The Incidence of the Healthcare Costs of Obesity”, *NBER Working Paper Series*, No. 11303, Cambridge, April 2005.

Curing – or preventing - obesity has costs in terms of time (to exercise), in terms of the price of better quality food, and in terms of effort related to dieting. And while the availability of medical treatment for obesity, such as surgical procedures, has increased, it is also very costly and disproportionately taken up by the rich. We posit that those with lower expectations and higher discount rates (in addition to less income) will be less likely to make such investments. In contrast, those for whom obesity is the only factor holding back future mobility - in contrast to those who perceive substantial barriers in the education, race, and income realms – will have stronger incentives to do so.

It is likely that norms and expectations are transmitted from parents to children, meanwhile.⁹ The probability that a child who is obese at age 3-5 will be obese as an adult is 24% if neither parent is obese, but 62% if one of the parents is obese when the child is age 3-5.¹⁰ While it is difficult to definitely separate the effects of genes versus the environment in driving these trends, given the role that parents play as role models for young children, it is likely that norms play some role.

This paper relies on surveys of reported well-being in line with the field known as the “economics of happiness.” The economics of happiness combines economics methodology with empirical realities observed by psychologists, relying on large surveys of reported well-being of individuals across countries and over time.¹¹ The approach is a useful tool for informing questions where the standard reliance on revealed preferences provides limited information. Such questions include the welfare effects of economic, social, and political arrangements which individuals are powerless to change. It is also well-suited to questions where behavior is driven by social norms, self-control problems, or other observed behaviors that may not reflect individuals' preferences. These include peer effects or norm changes driving participation in “deviant” behaviors such as membership in gangs; and the excess consumption of alcohol, tobacco, drugs, and other addictive substances.

We rely on survey data on obesity and on well-being for two of the countries with the highest obesity rates in the world, the United States and Russia. While these countries are at very different levels of economic development, the standard determinants of well being are very similar, as they are in most countries.¹² The relationship between obesity and happiness, however, is very different in the U.S. and Russia.

For the U.S., we rely on the National Longitudinal Survey of Youth (NLSY), which has been conducted since 1979 by the Bureau of Labor Statistics and has been following over 12,000 adolescents throughout their lives. While other data sets report trends in obesity in the U.S., this survey is particularly valuable because it has panel data on respondents' health, well-being, and a number of attitudinal variables. Additionally, we merged cohorts from the NLSY and the

⁹ For the U.S., see Anderson et al. (2003); for similar trends in France and Germany, see Lamerz et al. (2005) and Roman et al. (2005).

¹⁰ For detail, see Stephen R. Daniels, “The Consequences and Causes of Childhood Overweight and Obesity”, Paper prepared for conference for special issue of the *Future of Children*, Princeton University, Princeton, N.J., May 2005.

¹¹ For an overview of the approach, methods, and limitations, see Carol Graham, “The Economics of Happiness”, chapter in *The New Palgrave Dictionary of Economics*, revised edition, edited by Larry Blume and Steven Durlauf, forthcoming.

¹² There are, of course, modest differences, such as the fact that retirees are less happy in Russia. See Carol Graham and Stefano Pettinato, *Happiness and Hardship: Opportunity and Insecurity in New Market Economies* (Washington, D.C.: The Brookings Institution Press, 2002).

General Social Survey (GSS). The GSS is a large, over-time (not panel) survey for the U.S. While it does not have the detailed data on height and weight that is in the NLSY, it does have a standard happiness question, which is not in the NLSY. For Russia we rely on the Russian Longitudinal Monitoring Survey (RLMS), a nationally representative panel that has been conducted most years since 1995, with approximately 10,000 respondents in each year's survey and typically 2 or 3 over time observations for each respondent in the survey.

We find that there are very low well-being costs related to being overweight in Russia (except at very high levels), although these costs do vary across cohorts. It seems that being overweight in Russia, as in many developing countries, is a sign of prosperity rather than a sign of poor health.¹³ In the U.S., there is a negative correlation between obesity and income, but in Russia that correlation is strongly positive.¹⁴

These differences in the relationship between well-being and obesity across countries provide us with an opportunity to explore the channels that mediate this relationship – norms and expectations in particular. A fairly standard assumption is that obesity and unhappiness go hand in hand, yet our Russia data suggests that is not always the case. In the U.S., there is a certain amount of stigma attached to obesity. In post-Soviet Russia, meanwhile, obesity seems to be associated with greater prosperity, while being underweight is associated with poverty. The positive relationship between obesity and well-being in Russia diminishes only at very high levels, when presumably the negative health effects dominate the positive relationship with well-being.

Our findings have implications for public health policy in the U.S. and possibly in Russia. We posit that policy focuses too much on the narrow technical causes of obesity and does not take into account changing norms and expectations across socioeconomic cohorts, cultures, and countries.

A Poor Man's Problem?

Obesity and Well Being across Socioeconomic Cohorts in the United States

We test the hypothesis that norm differences (e.g. in the stigma or lack thereof attached to being obese) play a role in explaining variance in incidence. If norms differ across socioeconomic and racial categories, and it is a more accepted norm to be overweight or obese in one's particular cohort or category, then one is more likely to be obese (and thus the negative effects on happiness are likely to be lower). We do not expect that our measures of well being (in this case unhappiness) precisely isolate the role of stigma. There are likely other factors at play in explaining lower well being levels, not least poor health, and then feedback effects among these factors. Yet in the absence of a more precise measure and accepting the related problems of inference, we assume that our well being measures are likely capturing the negative effects of stigma on well being.

¹³ Michelle A. Mendez, Carlos Monteiro, and Barry M. Popkin, "Overweight Exceeds Underweight Among Women in Most Developing Countries", *American Journal of Clinical Nutrition*, Vol. 81, No. 3, March 2005; and Jaap C. Seidell and Aila Rissanen, "Global Prevalence and Trends in Obesity" in G.A. Bray, C. Bouchard, and W.P.T James, ed., *Handbook of Obesity* (New York: Marcel Dekker Inc., 1997).

¹⁴ The positive link between overweight and perceived well being, meanwhile, most likely existed in the Soviet period, when assuring plentiful food was a priority for the government, but then was exacerbated by the extreme rises in poverty levels after the transition.

A second and related hypothesis is the role of expectations for the future (and their links with occupational and other kinds of status). Our own work, as well as that of some other authors, finds that individuals with higher expectations for the future tend to be happier, to earn more income, and to be less likely to support redistribution, even if they are below mean income (presumably because they do not want to tax their future earnings). In general, people with higher levels of income and education tend to have higher expectations for the future – both for themselves and for their children.¹⁵

Individuals with higher expectations for the future may also have lower discount rates than those with low expectations, as they have more incentive to delay current consumption for future benefit. While the discount rate framework has primarily been applied to income and savings, our hypothesis is that it also may apply to public health behaviors, such as those that require reducing consumption and increasing physical effort for future health benefits.¹⁶ In addition, changing behavior is not free of costs, both in terms of time and income, as discussed above. The higher obesity related morbidity and mortality rates among lower income cohorts are a case in point. While we are not able to explore this hypothesis in as much detail as we do in our work on the role of norms, we examine a few proxies for expectations for the future in the case of our U.S. respondents.

Data

We use data on the NLSY panel survey of several cohorts of U.S. adolescents. Adolescents surveyed in 1979 were middle-aged by the latest survey year (2002). The NLSY has data on self reported height and weight, from which we compute BMI levels for all respondents, as well as on a number of questions about attitude which are designed to capture reported depression or low levels of well being. Approximately 18,000 observations in our 1979 NLSY sample have data for all of our variables. Because the NLSY over-samples blacks and Hispanics, we used the weights in our regressions as recommended by the NLSY.¹⁷

The NLSY questions we used to ascertain well-being are based on the Center for Epidemiologic Studies Depression (CESD) scale. We used principal component analysis to

¹⁵ Graham, Eggers, and Sukhtankar (2004); Manju Puri and David Robinson, “Optimism and Economic Choice”, *NBER Working Paper* 11361; and Roland Benabou and Efe Ok (1998). Graham, Eggers, and Sukhtankar find that happier people earn more in the labor market and are healthier in the future. Puri and Robinson find that optimists (defined as those people who think they will live longer than their socio-demographic profiles predict) are more likely to believe that future economic conditions will improve. In general, more optimistic people work harder and anticipate longer age-adjusted work careers. If they have gotten divorced, meanwhile, they are more likely to remarry.

¹⁶ A recent study of peoples’ willingness to participate in a voluntary smallpox vaccination program in the event of a smallpox attack/outbreak in Washington, D.C. found that only two-fifths of the population expressed willingness to go to the vaccination site. Part of the low response was due to fear of side effects on the vaccine, but part – particularly among African-Americans – was lack of trust in the delivery system and fears about the investigational status of the vaccine. Some participants explicitly expressed that their communities were considered “expendable” by the authorities – and thus were more likely to be experimented upon. Lack of trust in the system – like low expectations – makes these individuals far less likely to listen to and make the investments necessary to comply with preventive public health messages. See Testimony of Roz Lasker, M.D., to the Council of the District of Columbia, Committee on the Judiciary, October 25, 2004. For the full report on which this is based, see: <http://www.cacsh.org/eptpp.html>.

¹⁷ Details on the weighting method—which is programmed into Stata—are available on request from the authors.

create a composite variable, combining questions designed to assess whether or not individuals are depressed. These questions asked if in the past week respondents had any of the following problems: trouble concentrating their mind on a task; felt depressed; felt sad; had restless sleep; had a poor appetite; or could not get going. The questions have a Cronbach's Alpha of .8 (a test psychologists use to determine internal consistency of questions), which is a high score and indicates that we are indeed capturing a latent variable. It should be noted that this is of course different than medically diagnosed depression, but serves as a useful proxy for overall subjective well being.

We also merged data from NLSY cohorts (i.e., persons of a given gender, race, socioeconomic status and region, born in a given year) into corresponding cohorts from the General Social Survey (GSS), which has a yearly happiness question. We first report the analysis of individuals in the NLSY, and then of the cohort analysis.

Methodology

The fact that both data sets have observations over time for the same individuals is extremely valuable for our purposes, but introduces some econometric ambiguity in deciding on the proper model. We wanted to be able to account for genetic and/or individual idiosyncrasy yet still make generalizations about groups of people. Panel data sets often make use of "fixed effects", but the problem with that formulation is that unchanging attributes will be linear combinations of the fixed effects of individuals with those attributes. For example, we would be unable to isolate the effects of race, because (since it is an unchanging, congenital condition) the fixed-effect for every individual would include both that individual's personal tendency (toward obesity, for example) plus the tendency for that individual's group (e.g., his or her race's tendency toward obesity). To deal with this, we use "random effects", which are like time-invariant fixed effects averaged with cross-sectional (in our case, yearly) effects. These are more appropriate for our purposes, because our data is merely a random selection from the entire population, and the individual error component should capture both time-invariant (e.g., genetic) trends and cross-sectional effects.

A key technique that we use in the paper is analyzing the difference between regressions that do and do not contain intra-person correlations (e.g., OLS and random-effects). When introducing a correction for variables that may be correlated over time, some independent variables remain statistically significant and some do not. We take a loss of significance to indicate that a latent factor in the individual accounts for the correlation between both variables—and seek to analyze how societal norms do and do not account for those latent factors.

Analysis

We first analyzed what groups of people are likely to be obese. Using a standard logit specification, with obesity as the dependent variable and some standard socio-economic and demographic controls, we find that the probability of being obese is higher for those individuals who are older, have lower levels of income or education, are either black or Hispanic (as opposed to white), live in a rural (as opposed to urban) area, and who report feeling depressed.¹⁸ [Table 1]

¹⁸ The effect is strongest and most consistent for blacks. Our findings are supported by empirical studies, which finds that the incidence of obesity among black women are particularly high, but that incidence among inner city black children has also increased markedly in recent years, not only because of the kinds of foods that they consume but also because of their lack of available and safe recreational facilities. See

We then repeated the same regression with random effects. In this instance, the effects of age, income, education, and race all hold, but the variable for being depressed becomes insignificant. This may indicate that the random effects are picking up the individual character and genetic traits that make some individuals more likely to report being depressed than others. The same personality traits do not seem to explain obesity trends, however. We also ran the same regressions with each of our depression variables included separately, in lieu of the composite variable. With some modest differences among the individual variables, we get essentially the same results as with the composite variable, with the sign on the depression coefficient becoming insignificant once we control for individual effects.¹⁹

One possible explanation for the difference in results with and without individual effects may be that certain individuals experience mobility out of obesity and/or poverty and others do not. Those that do not are more likely to be depressed, and their particular traits are accounted for when random effects are included. A task for future research is to explore the mobility of our panel of respondents, both in terms of income and in terms of obesity (or weight change).

We also analyzed the determinants of depression. We ran regressions on both BMI and obesity because the former can provide information on a general correlation between weight and well-being, while the latter might capture a non-linear effect of obesity. With both specifications, we find that older, wealthier, married, and more educated people were less likely to report depression than were younger, poorer, less educated and single people. Women as opposed to men and blacks and Hispanics as opposed to whites were also less likely to report depression. Those with higher BMI values and obese people were more likely to do so than normal weight respondents.

With this specification, the results for both BMI values and obesity are robust to the inclusion of individual random effects. [Table 2] Thus while the inclusion of controls for individual personality traits takes up the effect of being depressed on obesity (e.g. the effect of being pre-disposed to being depressed), it does not take up the negative effects of obesity on well being.

Analogous to our above findings, respondents who are obese are also more likely to report feeling depressed if they are poor than if they are rich. There could be several plausible explanations for this. There is some evidence, for example, that minorities – who are also more likely to be poor – are much less likely to get medical attention for depression-related illnesses.²⁰ Thus wealthy, obese individuals may be more likely to get medical attention if they feel they are depressed than are less wealthy ones.

We also examined the link between obesity and depression according to race, income quintile, and quintile within race. We did this with both OLS and random-effects regressions of our composite depression variable on BMI and obesity. We find no significant links between reporting depression and obesity for blacks or for Hispanics. In contrast, the likelihood of reporting depression was higher (significant at the 10% level) for whites who had higher BMI values and who were obese. The results hold both with and without fixed effects. [Table 3] This

Emi Okamoto, Leslie Davidson, and Doris Conner, “High Prevalence of Overweight in Inner-City Schoolchildren”, *American Journal of Diseases in Children*, Vol. 147, February 1993.

¹⁹ Regression results based on the individual depression variables are available from the authors.

²⁰ Shankar Vedantam, “Patients’ Diversity is Often Discounted: Alternatives to Mainstream Medical Treatment Call for Recognizing Ethnic, Social Differences”, *The Washington Post*, June 26, 2005, p.A1.

provides modest support for our stigma hypothesis: because obesity is more the norm of blacks and Hispanics than for whites, then there may be less stigma – and related unhappiness – for obese respondents in the former categories than in the latter. Still, the strong links between depression, obesity, and income for whites and the higher incidence of obesity among blacks and Hispanics suggests that differences in norms across these groups are likely to have a role.

Some evidence from psychological research by Catherine Ross provides modest support. In a study of the links between overweight and depression, she finds being overweight per se had no effects on depression but rather that the link was moderated by norms. She found that overweight had direct effects on depression for those groups where thinness was the norm, and that those effects were driven by dieting and by poor physical health, both of which are associated with depression.²¹

The link between obesity and depression is due almost entirely to poor white respondents. For them, obesity has a very highly significant and positive effect on depression, while the effect is lower or non-existent in most other categories. There are some very modest associations between depression and obesity among poor Hispanics and wealthy whites.

General Social Survey Merge

Our findings based on the merged, GSS-NLSY cohorts are consistent with the above results. Our cohorts were based on gender, race, socioeconomic status and region, and year of birth. Each observation therefore was the average of the cohort for that variable; e.g., mean happiness, mean BMI, etc.

We ran a standard happiness regression on our cohorts, and found that the standard determinants of happiness are virtually the same as they are for our individual level NLSY sample. This adds support to our using the less-standard depression variables instead of a pure happiness question, which is present in the GSS but not the NLSY. Age and happiness have a U-shaped relationship, which is a standard finding in well being surveys. (It may be slightly problematic in our sample, as most observed respondents in the NLSY are younger than the age of the low point of happiness; therefore we use a non-quadratic age specification in most of our regressions). Wealthier and married people are happier and less depressed than average, while blacks are less happy and more depressed. Those that live in the northeast region, meanwhile, as opposed to the south, south-central, or north-central regions, are less happy than the average.

We ran a logit specification with obesity as the dependent variable for the full cohort sample (roughly 4000 observations). We include the usual socio-economic and demographic controls as well as happiness as independent variables. We find that those respondents that are older, poor, black, or Hispanic are more likely to be obese. There is no significant relationship with happiness, except for those in the highest income quintile, for whom obesity is negatively correlated with happiness. This suggests that for this generally happier cohort, obesity has some well being costs. [Table 4, 4a]

Our results based on cohorts with the merged data sets allow us to include the happiness variable that is in the GSS and seem to confirm a negative relationship between obesity and well being, holding primarily at the higher end of the socioeconomic scale. To the extent that there is a stigma effect attached to being obese, it seems to be among wealthier cohorts where overweight is

²¹ Catherine E. Ross (1994). “Overweight and Depression”, *Journal of Health and Social Behavior*, Vol.35 (March): 63-78.

less the norm. Obesity most likely has stigma effects and reduces the overall effects on happiness that come from other factors associated with wealth. In contrast, our analysis based on the NLSY and on depression rather than happiness suggests that those in the lowest quintile who are obese are more likely than the average to report depression. To the extent there are well-being effects, they are more closely linked to reported depression than to reported happiness, and could be a manifestation of the differences between these two psychological concepts. The effects of obesity on the poor may be associated with other variables (and possibly even character traits) that are associated with persistent poverty, such as low expectations for the future.

The Role of Status

The above results suggest that obesity is linked with a number of variables that correspond with “status”: income, geography, race, and education. As an additional indicator of status, we explored the linkages between occupation status and obesity (based on individuals in the NLSY in this instance, not our merged cohorts). Taking our norms and expectations hypothesis a step further, we posit that there may be certain expectations and norms about appearance in some occupations and not in others. In addition, people’s prospects for future income and professional promotion may also be higher in some occupations than others. If low expectations are indeed linked to higher discount rates, then those in lower status occupations with less prospects for the future should, in theory, be more likely to be obese than those in higher ones. This could be reinforced, meanwhile, by variance in appearance norms across professions.

We then conducted a primary component analysis of several of the NLSY variables that we believe are relevant to status: gender, race, income quintile, occupation, grade level, urban/rural, and region. The PCA analysis yielded unsurprising initial results: being male, white, in a high income quintile, education, occupational status, and living in the northeast or north central region were positively correlated with status; while black, Hispanic, and urban were negatively correlated. We created a rank variable based on the first 6 eigenvectors in the PCA analysis (which explain roughly 60% of the variance across the sample). The mean for the rank variable is zero, with positive numbers indicating higher rank and negative ones lower rank.

We regressed BMI on our rank variable and created a predicted BMI value for each rank. We created a “BMI-extra” variable for each respondent, which was the difference in his or her BMI from that predicted for his or her rank. We then regressed our composite depression variable on BMI-extra and find that having a BMI that is higher than the norm for one’s rank is significantly and positively correlated with our overall depression variable. (When we do not control for year, our results are insignificant, most likely because BMI has been trending upwards for all groups during the years of the survey.) [Table 5] In other words, departing from the BMI norm for one’s rank is significantly associated with lower well being.

We confirmed the robustness of these results with an alternative specification, in which we categorized each observation into a category of age, gender, race, income quintile, grade level attained, occupation, year surveyed, region, and urban/rural. We then generated a mean BMI for each group, and a new BMI-extra variable, which was the difference in each respondent’s BMI from the mean for his/her group. We regressed our overall depression variable on this BMI-extra variable and again find that there is a strong correlation between departing from the BMI norm for one’s group and reporting being depressed or unhappy.²² [Table 5]

²² As a check, we also tried two alternative specifications of BMI extra, and the results still hold.

This is strongly suggestive of a norms based explanation for variance in well being costs associated with obesity. The differences in these status-based results from those based on income and race alone suggest that the appearance (or other) norms associated with rank and/or occupation may be stronger – or at least have a more linear relationship - than those associated solely with income and race.

Recent labor market studies find that there is more wage discrimination against obese workers in high income occupations than in low ones.²³ This is supported by a study of perceived discrimination by psychologists Deborah Carr and Michael Friedman. Based on a large sample of U.S. respondents, they find that highly obese persons in professional jobs are more likely than their thinner counterparts and obese non-professionals to report job discrimination and daily discrimination. More generally they find that overweight and obese respondents are more likely to report job discrimination than are their normal weight counterparts. And while income and profession seem to moderate the effects of obesity on perceived discrimination, it is similar across race, gender, and age categories. As in the case of our results, these results suggest that the stigma attached to obesity is stronger across professional boundaries than more general demographic ones.²⁴

We also explored the role of expectations, to the extent that questions in our data allowed. We used two sets of questions that were asked of respondents in 1979. The first centered on occupation: “what kind of work would you like to be doing when you are 35 years old” (with structured responses) We then compared those answers with the occupational status that those respondents actually achieved when they were at or near that age. The second focused on education: “what is the highest grade or year of regular school that you would like to complete?” and then “as things now stand, what is the highest grade or year you think you actually will complete” and compared the desired levels with those that were assessed as attainable.

We found that there was a positive correlation between reporting depression and not achieving one’s desired occupation, but no link with obesity. There was, however, a positive correlation between educational pessimism; in other words, respondents who felt that they would attain less education than they desired were more likely to be obese than others, finding that holds even when controlling for person fixed effects.²⁵

This provides some modest support for our hypothesis that expectations may play a role in driving obesity rates. The link is stronger in the educational realm than in the occupational one in this instance. This may be due to the nature of the questions. It is likely that most teen-aged respondents can more accurately assess the years of education that are likely to attain – given that they are already well into that education - than the profession they will be in twenty some years later. Thus the education question is more likely capturing realistic expectations about the future, while the occupation question is more speculative.

Identifying the direction of causality between diverting from the weight norm for one’s peer group and the well being costs associated with that deviation suffers from endogeneity

²³ See Battacharya and Bundorf (2005).

²⁴ Only the most obese people (BMI > 35) report health care related discrimination, meanwhile. Severely overweight people are also more likely to report lower levels of self acceptance than the average, although this effect seems to be mediated by their perceptions of discrimination. See Deborah Carr and Michael Friedman, “Is Obesity Stigmatizing? Body Weight, Perceived Discrimination, and Psychological Well-Being in the United States”, *Journal of Health and Social Behavior*, September 2005.

²⁵ Regression results available from the authors.

problems. Lower incidence of deviation suggests more “punishment” in terms of stigma. Alternatively, more stigma might also deter deviation, suggesting that there are greater (negative) incentives preventing weight gain for higher status groups. Thus status (or income) could be factors explaining incidence variance in addition to norms.

It is also difficult to definitively establish a direction of causality between obesity and reported unhappiness or depression. Psychologists often posit that the causality runs from mental health to physical health – e.g. from depression to obesity – while accepting that it can run in both directions. A study by Carol Ryff and colleagues, based on a sample of 135 aging women in the United States, found that women with higher levels of eudaimonic well-being had lower levels of daily salivary cortisol, cardiovascular risk, and longer duration of REM sleep than did those with lower levels of well-being. (Eudaimonic well-being is defined as the realization of personal potential; distinct from hedonic well being, which is the experience of satisfaction). Of those women, those who scored positively on one component of the well-being measure - positive relations with others – also had higher levels of HDL (good) cholesterol, and lower weight and waist hip ratios.²⁶

Clinical research on children finds that their obesity is associated with lower levels of self esteem and higher rates of clinical depression.²⁷ The authors of these studies posit that causality could run in either direction: youth with depression are at higher risk to develop increased BMI, and at the same time, depression is associated with abnormal patterns of eating and physical activity which can result in future obesity. Low self esteem could, in the long run, be a factor prolonging obesity into adulthood, and is also associated with lower health related quality of life.²⁸

Our own work on the U.S. suggests that the causality runs from overweight to unhappiness, rather than the other way around. We regressed our composite depression variable on lagged BMI-extra (our variable for BMI levels that diverge from the norm for the respondent’s income, education, age, race, and regional cohort) and lagged reported depression, controlling for person fixed effects. We find that lagged depression (unsurprisingly) and lagged BMI-extra correlate positively and significantly with current reported depression. In contrast, when we include lagged BMI rather than BMI-extra (pure BMI as opposed to BMI relative to one’s rank) it is insignificant. BMI relative to one’s reference norm seems to cause unhappiness, but BMI *per se* does not.

When we regress BMI-extra on lagged BMI-extra and lagged reported depression, we get the expected positive and significant sign on lagged BMI-extra, but no significant relationship between past depression and current levels of BMI-extra. Lagged depression is also insignificant on current levels of BMI. [Table 6]

²⁶ The latter group were also less susceptible to diabetes. Carol D. Ryff, Burton Singer, and Gayle Dienberg Love, “Positive Health: Connecting Well-Being with Biology”, *The Royal Society*, Vol.359, (2004), pp.1383-1294.

²⁷ Daniels (2005).

²⁸ A number of studies find a strong association between happiness and self reported health, and then between self reported health and future health outcomes. See, among others, Carol Graham, Andrew Eggers, and Sandip Sukhtankar, “Does Happiness Pay? An Exploration Based on Panel Data for Russia”, *Journal of Economic Behavior and Organization*, Vol. 55, 2004; and Ed Diener and Martin Seligman, “Beyond Money: Toward an Economy of Well-Being”, *Psychology in the Public Interest*, Vol. 5, no.1, 2004.

Our intuition about causality is supported by our above findings, in which the inclusion of person fixed effects overwhelm those of depression on the probability of being obese, while the negative effects of obesity on well being are robust to the inclusion of fixed effects. It suggests that the causality runs being overweight relative to one's peers to unhappiness and/or depression, rather than the other way around, at least for our sample of U.S. respondents. And regardless of the cause of deviating (or not) from the norm, those that deviate seem to suffer well being costs.

Conclusion

Obesity incidence in the U.S. is amongst the highest in the world. Our empirical analysis confirms the result of many other studies, which find that incidence is higher in cohorts at the lower end of the income distribution, and among blacks and Hispanics. In addition, we find that obesity incidence is also correlated to occupational status, with incidence significantly higher in lower status occupations than in higher status ones. We also find that there are significant well being costs to being obese in the U.S.

The well being costs seem to be higher for the poor than for wealthier cohorts, perhaps because the latter are more likely to get medical help for depression than are the poor, and/or because the poor may be less able to manage the negative health costs associated with obesity. At the same time, we find that obesity also has well being costs for those in the very top quintile, costs which are likely due to stigma among cohorts where obesity is not the norm.

There are also significant differences across racial cohorts. The poverty-obesity-depression link is strongest for whites, but does not hold for blacks and Hispanics. Given that obesity incidence is much higher among the latter two cohorts, it is plausible that obese whites feel more stigma than do their black and Hispanic counterparts.

The well being costs of obesity are also higher for those that depart from the norm for their rank/status cohort. Because incidence is so much higher in low status occupations, this suggests that being obese in high status occupations carries higher well being costs than in lower ones. This provides modest support for one of our initial hypotheses: that the well being costs of obesity should be higher in cohorts where the deviation from the mean for that cohort was higher. We find modest evidence, meanwhile, that causality runs from departing from the weight norm for one's rank or status to depression rather than the other way around.

In support of this, other studies find that the perceived discrimination associated with obesity increases with professional status, and that those perceptions are associated with lower levels of well being. Norms about appearance seem to be stronger and vary in a more linear manner across occupation and other status variables than they do across income and racial groups.

The strong links that we find between obesity and reported depression, particularly for the poor, certainly do not bode well for the future health outcomes of these individuals. These characteristics suggest that public health messages based on promoting better consumption and exercise practices may have less than the expected impact. This is particularly the case if these respondents have higher than average discount rates, due to low expectations for the future and thus lower incentives to delay consumption and spend income and effort to exercise.

In contrast, the same messages might be far more effective among our wealthier obese respondents and those employed in higher ranking occupations, whose well being costs

associated with obesity are more likely to be driven by stigma than they are by inadequate access to medical care or low expectations for professional and other forms of advancement. Our results cautiously suggest the need for more nuanced and better targeted public health campaigns to combat obesity in the U.S.

The precise policies that can be derived from the results are less clear. Increasing stigma associated with obesity seems acceptable from a normative perspective and would likely have associated welfare costs. Increasing awareness of the problem is not enough in the face of strong norms, low expectations, and high discount rates. A potential direction would be a range of strategies for increasing the availability and affordability of weight loss and prevention measures for low income groups, while at the same time focusing public awareness on the extent to which the health consequences of the problem are concentrated within their ranks. While such measures would, no doubt, have fiscal implications, they would to some extent be countered in the long run by a reduction in morbidity in these cohorts, who tend to be uninsured or to rely on Medicaid.

Donald Trumps and Desperate Housewives: Fat = Happy in Russia?

A central question in our research is the effect of norms in explaining variance in obesity rates across countries and cohorts within countries. During the Soviet era, Russia had one of the highest obesity rates in the world, and certainly the highest in Europe.²⁹ Rates have not gone down in the post-Soviet era, remaining on par with or slightly higher than that of the U.S., depending on which estimates are used. In contrast to the U.S., though, obesity does not seem to be a focus of public health attention or policy in Russia.

We find that there are very low, if any, well being costs associated with being obese in Russia (except at extreme levels). Being overweight in Russia, as in many developing countries in the transition from lower to higher levels of income, seems to be a sign of prosperity rather than a sign of poor health.³⁰ There does not seem to be any “stigma” effect, as there is among some cohorts in the U.S. In contrast, obesity in Russia is correlated with a number of positive traits, such as higher happiness and perceived status, although with significant variance in those correlations across gender and socioeconomic cohorts. The remainder of the paper is devoted to describing these findings.

Data

We rely on RLMS data from 1995-2003, and use the standard definition of overweight and obese, based on BMI values calculated from respondents’ reported height and weight.³¹ We had a total of 62,073 valid observations in our data set, with repeated observations on approximately 12,000 individuals. Thirty-three percent of the respondents in our sample qualify as obese.

²⁹ Bray et al. (1997).

³⁰ Michelle A. Mendez, Carlos Monteiro, and Barry M. Popkin, “Overweight Exceeds Underweight Among Women in Most Developing Countries”, *American Journal of Clinical Nutrition*, Vol. 81, No. 3, March 2005; and Jaap C. Seidell and Aila Rissanen, “Global Prevalence and Trends in Obesity” in G.A. Bray, C. Bouchard, and W.P.T James, ed. (1997). *Handbook of Obesity* (New York: Marcel Dekker Inc.).

³¹ Our survey has both respondents’ reported height and weight, as well as that measured and recorded by the interviewer. The correlation coefficient between these two variables was high: .97. We chose to use the former measure as there were fewer missing observations.

