VARIANCE IN OBESITY ACROSS COHORTS AND COUNTRIES: A NORMS-BASED EXPLANATION USING HAPPINESS SURVEYS

Carol Graham and Andrew Felton*
The Brookings Institution, Washington, DC

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Abstract

We use well being surveys to help explain the variance in obesity incidence across socioeconomic cohorts in the United States and Russia, with a focus on the role of norms. In the U.S., obesity is largely a poor people's problem, and the same groups suffer higher well being costs from being obese. Poor whites have higher obesity-related well being costs than blacks or Hispanics. Respondents in the top income quintile who are obese and those who depart from the weight norm for their profession also suffer higher well being costs than the average. Stigma seems to be higher for those in higher status professions. We find modest evidence that causality runs from overweight to depression rather than the other way around. In Russia, in contrast, obesity and well being are positively correlated. The relationship seems to be driven by the prosperity that is associated with obesity rather than by the excess weight per se, and we find no evidence of stigma. In both countries, there is a wide margin in both countries for tailoring public health messages to marshal the attention of very different cohorts.

* The authors are, respectively, Senior Fellow and Senior Research Analyst in the Economic Studies Program at the Brookings Institution. Carol Graham is also a Professor in the School of Public Policy at the University of Maryland. They thank Mary Burke, William Dickens, Richard Easterlin, George Graham, Branko Milanovic, Alois Stutzer, and Peyton Young for helpful comments on earlier drafts.

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]

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[1] The standard definition of BMI is based on a weight to height ratio, in metric units: BMI= kg/m^2. 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 el 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.

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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.

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[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 attach/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

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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]

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[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.

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[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.

Obese respondents tended to be older and female: 23% of the obese are men, while 77% are female. Across the entire sample, higher BMI levels were correlated with lower income levels. However, within groups (in other words, controlling for income, education, and other socio-demographic traits), respondents with higher BMI values tended to have higher status and income levels than those with lower BMI values.[32]

Not surprisingly, obese Russians in our sample have lower levels of health, as gauged by objective measures. Obese respondents had a higher likelihood of having type 2 diabetes and having trouble walking.

In contrast to our measured health data, we find a very strong and positive correlation between higher BMI levels and happiness (reported well being) in Russia. We again use OLS regression with random effects, reported life satisfaction as the dependent variable and controls for socioeconomic status and year.[33] We find that overweight and obese people are, on average, happier than those who are normal weight, while underweight respondents are significantly less happy than the average. [Table 7] We alternatively use a continuous variable based on respondents' BMI, calculated on reported height and weight data, and categorical dummies for the four weight categories (obese, overweight, normal weight, underweight). To explore non-linearities, we also included a squared BMI variable. There is a quadratic, reversed–U shape relationship between BMI and happiness; the point at which BMI levels began to have negative effects on happiness is 33.5. This is quite obese by most countries' standards: a person six feet tall would have to weight almost 250 pounds to reach that level.

Self-reported health was also correlated with higher BMI levels. In general, self reported health tends to be correlated with happiness levels. In this instance, the positive character traits (or other unobservables) driving the correlation between happiness and self reported health seem to be stronger than the negative effects of overweight/obesity on health. The turning point on BMI values for self reported health was lower than that for happiness, though, at a value of 27, which is overweight but not obese. This suggests that as BMI values approach the obesity level, associated health problems begin to affect reported health rankings.[34] Underweight respondents, meanwhile, have lower levels of self-reported health, which also correlates quite closely with their lower happiness scores. [Table 8]

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[32] The more general low income finding may be driven in part by farmers, who are typically heavier than the average and also at the bottom of the income distribution.

[33] Because happiness is a categorical variable, orthodox econometrics calls for the usage of ordered probit or logit models (with the former being better for normal distributions and the latter for fat tailed ones). However, those models do not allow us to take advantage of the over time nature of our data and control for random effects across individuals, as OLS does. In addition, identical happiness equations using both OLS and ordered logit models usually yield coefficient values and standard errors that are remarkably similar. Thus there is increasing acceptance of using the flexibility that comes from using OLS – and treating happiness as a continuous variable – in these equations. For a fuller discussion of this, see Bernard Van Praag and Ada Ferrer-i-Carbonell, *Happiness Quantified: A Satisfaction Calculus Approach* (Oxford: Oxford University Press, 2004). Finally, the categorical specification of the happiness variable is an artifact of the survey and is not based on any priors that there are categorical rather than continuous differences in happiness when respondents move from one category to the other.

[34] This difference shows up in our regression results. Those reported in Table 8 show a negative relationship between self-reported health and our dummy variable for being obese. There is a quadratic relationship, however, when we use BMI and BMI squared instead of the dummy variable.

To ensure that we were not capturing a spurious correlation, we looked at the effects of lagged happiness on BMI levels. We calculated a residual happiness variable for each respondent – i.e., happiness not explained by the usual socio-demographic variables – in a first stage regression with data from t_0. We then regressed period t_1's BMI on t_0's residual happiness and t_1's happiness. Lagged unexplained happiness is also positively and significantly correlated with BMI levels. [Table 9] We also measured the effects of change in weight on changes in happiness over the period. We find that positive changes in weight (measured both as levels and percent changes) were positively correlated with changes in happiness, for all groups.

In previous work on Russia, we found that getting divorced was the change variable that had the most significant and negative effects on changes in happiness of any variable, including job loss.[35] We created a "got divorced" variable for our panel; e.g. a variable representing those respondents that got a divorce between the first and second periods. Not surprisingly, we find that lagged happiness is negatively correlated with getting divorced. More notable is that lagged BMI is also negatively correlated with getting divorced!

There seems to be little doubt that overweight and obese Russians are happier than the average. We do not attribute any causal properties to being overweight; rather it is likely that higher BMI levels are correlated with happiness because there are unobservable variables that raise both the happiness and BMI of those respondents. At minimum, there is clearly no evidence of stigma or other negative effects of being overweight on the well being of our Russian respondents. Indeed, we find that obese Russians that are employed earn higher wages than the average.

We examined a number of variables that serve as proxies for status. One question in the RLMS asks respondents "if your society is a nine step ladder where the poor are on 1 and the rich are on 9, where would you rank yourself". Two subsequent questions then ask respondents to rank themselves on a power and respect rank ladders for their society. We find that higher BMI levels are positively correlated with all of these rankings. When we square our BMI variable to see if there is a relationship, we find that the turning point on BMI is even higher than that for happiness in these rankings, at 36, 41, and 34 for the economic, power, and respect rankings respectively. Again, respondents in Russia need to be extremely obese before the positive correlation between BMI and status begins to erode. [36]

In general, men score higher than women on the ladder rankings, with the exception of the respect rank, where there is no significant difference between the two groups. Using principle component analysis to combine the respect variables, we find that the highest average status rankings are found in Moscow, St. Petersburg, and the North Caucuses. (The latter also happens to be the region with the highest happiness and BMI levels).

We then looked for variance across regions and cohorts. Our hypothesis was that norms differ across regions, and that respondents in Moscow and St. Petersburg, regions which are more likely to be influenced by foreign investment, global information, and international visitors than are more remote or rural regions, would thus to conform more to international norms (such as those in the U.S. and Europe). In that instance, obesity might carry more of a stigma effect in those regions than in the rest of the country.

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[35] See Carol Graham, Andrew Eggers, and Sandip Sukhtankar (2004). "Does Happiness Pay? An Initial Exploration Based on Panel Data for Russia", *Journal of Economic Behavior and Organization*, Vol. 55, pp.319-34.

[36] Regression results available from the authors.

Supporting that intuition, we found that BMI levels were slightly lower in Moscow and St. Petersburg (and in the Urals and Volga regions) than in the rest of Russia. Yet when we ran our standard happiness regression for respondents in Moscow and St. Petersburg only, again with overweight and obese as independent variables, we found the same positive correlation between overweight and obese and happy, and the coefficients are of a similar magnitude. Thus, while there may be a different levels effect, as these respondents having slightly lower BMI's than in the rest of the country and therefore a lower starting point for the relationship between overweight and happy, the slope of the positive "effect" is similar for Moscow and St. Petersburg as it is in the rest of Russia. [Table 7]

We also looked across occupations. Unlike in the U.S., we found only modest differences across occupations. The only occupation category that was more likely than others to have overweight and obese respondents was that of self-employed people with employees. Respondents that were managers, meanwhile, were more likely to be overweight, but not obese. The lack of a clear relationship may stem from the more general lack of stigma attached to being obese in Russia than in the U.S., or from the extent to which standard occupation categories are less useful in a transition economy where standard market sectors co-exist with large sectors of the economy that continue to operate on a semi-market, semi-barter basis.[37]

There clearly are gender differences in the incidence of obesity in Russia. We explored whether the well being costs (or benefits, as seems to be the case in Russia!) of obesity were also different across genders. We divided our sample into obese men and women, as well as underweight men and women. We found that both obese and underweight women were more likely to be concerned about providing essentials in the next year than were the average respondents in the sample. Obese men, in contrast, were less likely than the average to have such concerns. Obese women were more likely to be older, not married (widowed, for the most part), unemployed, and less happy than the average (although they did have a higher respect ranking than the average).

Obese men were also more likely to be older, but in contrast to their female counterparts, were more likely to be married, working, and happier than the average (and also scored higher on the respect as well as the other ladder rankings). [Table 10] The relationship between weight and happiness for employed women, meanwhile, resembles that for men more than that for unemployed women. Employed women have slightly lower mean BMI levels than unemployed women, and have a positive correlation between BMI and income, as in the case of men in general.

The most underweight (and poorest) women live in Moscow, while those with the highest BMI values tend to be in the middle of the income rankings. The men with the highest BMI's are either high controllers (top income bracket) or farmers (lowest income bracket). Using a question which asked respondents if their skills were valued in today's society, we found that a high score on being valued was positively correlated with BMI for males (farmers excluded), but insignificant for women. [Table 11]

We also found that levels of satisfaction with one's economic situation were more positive than the average for obese men (farmers excluded). Yet this was not the case for obese

[37] For detail on this, see Barry Ickes and Clifford Gaddy, *Russia's Virtual Economy* (Washington, D.C.: The Brookings Institution Press, 2002).

women that were married and unemployed. Happiness was positively correlated with BMI for the same set of obese men, but not for our obese, married, unemployed women.

There are significant differences in the effects (and/or the correlation with unobservables) of higher BMI levels across gender and occupation status in Russia. For working men, obesity seems to be correlated with higher status and perhaps with other variables that are associated with higher levels of well being. Most obese men had higher status professions than the average (therefore our borrowing of the term "Donald Trumps").

For unemployed, married women, meanwhile, there is a positive correlation between obesity and status, but there is not a similar positive correlation with happiness. This suggests that the rank effect for these women may come from their husband's occupations - but that it does not translate into increased well being for the women themselves (i.e., our desperate housewives).

Finally, we created a social status variable similar to the one we used for the U.S. and analyzed the welfare effects of the respondent's having a BMI that departs from the norm for his or her particular status. When we do not control for socioeconomic and demographic traits in the regression, we get a negative and significant relationship between departing from the BMI norm for one's status group and life satisfaction. When we control for those traits, however, the significance of BMI disappears. [Table 12]

In a related exercise, we included the social status variable and BMIextra as controls in a happiness regression. We find that BMIextra is negatively correlated with happiness, while rank is positively correlated. [Table 12] This clearly departs from the above findings, when the socio-economic and demographic variables are included separately and render the effects of BMIextra insignificant. It may be that in Russia, rank is less of a linear variable than in the U.S. In the latter, income, education, and occupation tend to have a fairly linear relationship. In Russia, where the returns to pre-Soviet education have gone down markedly for many cohorts and at the same time some of the economy still functions on a pre-transition, barter basis (discussed above), the relationship is less straightforward. This might explain why merging all of the occupation and socio-economic variables produces a different result than including them separately in Russia, while the two specifications produce similar results in the U.S. Both sets of results on BMI extra, however, suggest that the positive relationship between BMI and happiness is mediated by rank.

Most of our results support the rest of our analysis for Russia, which suggest that higher BMI's are associated with higher status and incomes, which in turn are linked to higher happiness levels. The insignificance (and sometimes negative nature) of our results on BMI and happiness suggest that it is not the higher weights per se that lead to higher happiness levels, but rather that higher status and incomes associated with them that do (and happier people are also more likely to attain these higher incomes, as cited above), and these people are also more likely to be overweight. In Russia, as in many developing countries newly emerging from poverty, overweight is still seen to be more of a signal of prosperity than it is a health risk.

Given that prices for food were rising at a fairly rapid rate during this period in Russia, and that the large majority of Russians grow a significant percentage of their own food, either in their backyards or on off-site plots, our findings seem to run in the opposite direction of the price hypothesis that is often used to explain rising obesity incidence in the U.S. The hypothesis states that in the U.S., the availability of cheap food which requires little preparation time is in large part to blame for increases in obesity, particularly for low income groups and families with two

working parents.[38] In Russia, in contrast, where home grown food is the norm, and prices are rising for food purchased in stores and restaurants, access to excess amounts of food – as demonstrated by overweight and obese status – seems to be a sign of status for high income rather than low income groups.[39]

In the U.S. it is expensive to be thin and in Russia it is expensive to be fat. While this does not dismiss a role for cheap food in explaining obesity in the U.S., it certainly does not hold for Russia, and factors other than price seem to be at play in both. Even if Russia evolves to look more like the U.S., where cheaper food make it easier for the poor to be fat, then norms would have to evolve before the rich chose to be thin. In contrast, in the U.S., cheap food can explain the increased incidence of obesity in general, but not the variance across socioeconomic and racial cohorts.

We do not believe that high BMI levels have causal effects on happiness. Instead our intuition is that within our various socioeconomic, gender, and occupational cohorts, higher rank tends to be associated with higher levels of happiness, which in turn may lead to higher levels of BMI. Our priors are, however, that over time those higher levels of BMI may lead to deteriorating health and then lower happiness levels.

We find no evidence of stigma associated with obesity and overweight in Russia. While the extremely obese have lower reported (and measured) health and lower happiness levels, this is only at the tail of the distribution. For the most part, overweight and obese respondents report themselves to be better off and healthier, even though their measured health is worse. Obesity is also positively correlated with a number of status variables, such as rankings on societal economic and power ladders.

This positive "effect", however, is mediated by gender and occupation status. For men in the workforce – and in particularly in high status occupations - the correlation between BMI levels and a range of status and well being variables is strong and significant. For unemployed women, there is no positive effect associated with being overweight (but there does not seem to be a stigma effect either).

We do not believe that BMI levels have any causal properties, but rather that the associations that we find are reflecting differentials in status across gender and occupation groups in Russia – a proposition which finds some support in our analysis of the well being costs of obesity based on rank norms. Because there is no stigma effect associated with being overweight – and indeed it may still be a sign of prosperity – higher BMI's may actually reflect the prosperity attained by those high status individuals. In the case of our desperate housewives, meanwhile, the channel may be quite different: higher BMI's may be the result of unhappiness and lack of future opportunities, even though they are not necessarily a sign of stigma. Alternatively, high BMI levels may merely result from social interactions with spouses whose weight is increasing as a result of higher rank, and have no relationship with happiness at all.

In the longer run, extremely high BMI levels tend to cause poor health, which in turn causes unhappiness. The health costs associated with reaching these high levels of BMI, however, are too high for public policy to lag behind. There seems to be a wide margin for heightened public awareness of the health risks associated with overweight and obesity in Russia.

[38] See Cutler, Glaeser, and Shapiro (2003).

[39] For a description of the remarkable extent to which Russians rely on food grown in domestic plots, see Gaddy and Ickes (2002).

Conclusion

Our analysis on the effects of obesity on well being in the United States and Russia was based on the hypothesis that the variance in incidence in obesity across socioeconomic cohorts, races, cultures, and countries is driven in part by differences in norms about appearance as well as differences in expectations about the future. Both of these could lead to differences in discount rates and responses to public health messages. Some of our results support these priors; others do not.

In the U.S., we find that obesity is largely a poor people's problem, and the same groups also suffer higher well being costs from being obese. It is more the norm to be obese if one is poor in the U.S. than if one is rich. The higher weight norm does not seem to mitigate the well being costs for these groups in general, as we initially hypothesized. It does, however, seem to do so across races, with poor whites having higher obesity-related well being costs than blacks or Hispanics. Those in the top income quintile who are obese, who are more likely to be outliers for weight for their income cohort, also suffer higher well being costs than the average. Our poor obese respondents are probably less likely to receive adequate medical attention for either depression—or for the health costs associated with obesity, while the wealthy obese are more likely to have access to good medical care, but are also more likely to feel stigma associated with their obesity.

We also found strong evidence of stigma associated costs at the status and professional level. We found a very strong negative relationship between departing (upwards) from the weight norm for one's rank or status and well being. Because the weight norms for higher income and status professions are lower, the related well being costs, which vary with the extent of the departure from the mean or norm, also seem to be higher. Research on labor markets by economists and on perceived discrimination by psychologists also supports our results: discrimination is more likely to be linked to professional status than to race or gender, and it is highest in the better paying, higher status professions. To the extent that the well being costs related to obesity stem from stigma rather than from health related causes, they are likely to be higher for those in higher status professions. To the extent that reference norms play a role in that relationship, they seem to have a more linear effect across professional and other status distinctions, which are more obvious reference norms, than across broader income, race, and gender categories.

We find modest evidence that departing from the weight norm for one's rank in previous periods is more likely to lead to current levels of depression than the other way around. We found no significant evidence of past depression leading to obesity, although there is clearly a correlation between obesity and depression. It is plausible (although far from certain) that obesity, which is the combined result of poor diet and lack of exercise, of differences in appearance norms, of low expectations for the future, and any number of other causes, then leads to both stigma and health problems, which in turn lead to lower levels of well being.

In Russia, in contrast, obesity is linked to higher levels of well being and even to higher levels of self reported health. This finding is robust a number of specifications and robustness checks. Women are much more likely than men to be obese in Russia, but the correlation with well being is stronger for men. Obesity is most prevalent at the highest and lowest rungs of the economic ladder; professionals and other high status occupations in the first instance, and farmers in the second. Being underweight, meanwhile, is strongly associated with being poor and with living in an urban setting.

Obese men are more likely to report having a higher status, to have a higher paying and higher status job, and to be happier. Obese women, meanwhile, are also more likely to report higher status and to be wealthier than average. They are not, however, happier as are their male counterparts. We posit that the obese men are not happy because they are obese, but rather that obesity has accompanied their new prosperity, which is what makes them happier. Obese women, who are disproportionately unemployed and possibly married to the wealthy obese men, have shared in the benefits of prosperity but perhaps not in the satisfaction that came from attaining it. Employed obese women, in contrast, are more likely to resemble their male counterparts, with the relationship between obesity and well being mediated by their professional status. Obesity in Russia seems to be a sign of prosperity, as it is in many poor countries emerging from poverty.

This finding – and in particular the link between obesity and status – is quite distinct from the price hypothesis that is often used to explain obesity incidence in the U.S. As opposed to the U.S., where the availability of cheap food is one explanation for obesity increases among the poor, in Russia, where the availability of home grown food is widespread, access and consumption of increasingly expensive purchased food – and related increases in overweight – seem to be a sign of status rather than poor health. Prices may play a role but that role may change over time and also interact with that of norms. In the U.S., it is expensive to be thin and in Russia it is expensive to be fat. Even if food prices go down in Russia and the poor also enter the ranks of the overweight/obese, it would still entail a norm change for the rich to make the efforts required to exit those ranks.

The extent of obesity in both countries, and the very clear health consequences and costs associated with it, calls for better public health responses. In the U.S., different socioeconomic and racial cohorts are most likely responding to public health messages differently. Those in higher status professions – who report discrimination and well being costs associated with departing from the norm for their rank or status – are more likely much more aware of, and possibly responsive to, public health messages about obesity than are the obese respondents at the lower end of the economic scale, who report that they are depressed and/or cannot control their lives. Public health messages need to take these very different audiences into account, and, as is suggested above, account for higher discount rates among certain cohorts, which make the high costs of obesity prevention and reduction even higher (in inter-temporal terms) for these groups.

In Russia, the lack of stigma associated with obesity suggests that there is little awareness of its negative health consequences. It seems that there is a great deal of room for more general messages about the dangers of obesity, although perhaps directed more towards the wealthy than towards the poor, at least at this juncture.

In sum, our focus on norms and expectations in explaining variance in obesity incidence suggests that the relationship between well being and obesity is quite complex. In the U.S. it is largely a negative relationship, driven by stigma for those in high status professions and by lower reported well being and higher reported depression among the poor. What drives these trends in the latter group is not clear. It could be the health consequences associated with obesity; it could be the more general lack of access to medical attention; or it could be other factors associated with poverty – such as low expectations – which reinforce the same factors that drive obesity, such as depressed individuals' lack of control (real or perceived) over their own lives.

In Russia, the relationship between obesity and well being is surprisingly positive and consistent. In this instance we think the relationship is driven by the prosperity that is associated with – and most likely precedes obesity – rather than by the excess weight per se. This is

supported by the quadratic relationship between happiness and BMI, with the positive relationship becoming negative at very high levels of obesity. Unlike in the U.S., we could find no evidence of stigma associated with obesity in Russia, even in the more international and most developed metropolises. To the extent there is a norms effect, it still seems to be one that drives weight trends upwards as a sign of prosperity, status, and success, leaving a great deal of margin for improvement on the public health and awareness front.

Table 1: Determinants of Obesity in the U.S.

dependent variable: obesity dummy

	logit		logit w/ random effects	
age	0.057	***	0.065	***
male	0.146	*	0.131	
hispanic	0.566	***	0.519	***
black	0.609	***	0.640	***
married	-0.087		-0.053	
separated	-0.194		-0.152	
divorced	-0.660	***	-0.531	***
widowed	-0.341		-0.300	
income quintile 1	0.161		0.161	
income quintile 2	0.012		0.046	
income quintile 4	-0.093		0.012	
income quintile 5	-0.405	***	-0.194	*
region: north east	0.048		0.012	
region: north central	0.101		0.121	
region: west	-0.177	*	-0.081	
urban	-0.230	**	-0.148	
grade level	-0.060	***	-0.067	***
professional and technical	-0.123		-0.143	
managers and administrators, except farm	-0.028		-0.018	
sales workers	-0.349	*	-0.248	*
craftsmen	-0.026		-0.008	
operatives, except transport	-0.076		-0.003	
laborers, except farm	-0.021		0.026	
farmers and farm managers	-0.251		-0.184	
farm laborers and foremen	0.132		-0.207	
service workers, except private household	0.260	**	0.191	
private household workers	0.014		0.127	
not in labor force	0.034		0.151	
unemployed	-0.015		0.093	
depression	**0.046**	****	**0.015**	
constant	-2.536	***	-2.900	***

for all tables: * p<0.05, ** p<0.01, *** p<0.001

Table 2: Determinants of Well Being

coefficients and significance from regression of composite depression variable (positive numbers -> higher depression)

	OLS		random effects		OLS		random effects		OLS		random effects	
age	-0.001		-0.005		-0.003		-0.007		-0.002		-0.006	
male	-0.566	***	-0.576	***	-0.579	***	-0.587	***	-0.568	***	-0.578	***
hispanic	-0.076		-0.072		-0.090		-0.085		-0.085		-0.080	
black	-0.133	**	-0.134	**	-0.157	***	-0.157	**	-0.144	**	-0.144	**
married	-0.238	***	-0.243	***	-0.242	***	-0.247	***	-0.236	***	-0.242	***
separated	0.596	***	0.607	***	0.624	***	0.634	***	0.599	***	0.610	***
divorced	0.030		0.000		0.019		-0.009		0.040		0.009	
widowed	0.400		0.366		0.435		0.407		0.406		0.372	
income quintile 1	0.488	***	0.478	***	0.481	***	0.464	***	0.484	***	0.475	***
income quintile 2	0.235	***	0.240	***	0.224	***	0.226	***	0.235	***	0.239	***
income quintile 4	0.023		0.036		0.021		0.031		0.025		0.037	
income quintile 5	-0.013		0.002		-0.029		-0.016		-0.008		0.005	
region: north east	0.121	*	0.105		0.119	*	0.103		0.120	*	0.104	
region: north central	0.106	*	0.094	*	0.112	**	0.098	*	0.105	*	0.093	*
region: west	0.092		0.079		0.097	*	0.082		0.095		0.080	
urban	0.081		0.080		0.086	*	0.086		0.085	*	0.083	
grade level	-0.045	***	-0.049	***	-0.043	***	-0.047	***	-0.044	***	-0.048	***
professional and technical	-0.046		-0.011		-0.053		-0.015		-0.045		-0.010	
managers and administrators, except farm	-0.071		-0.032		-0.077		-0.036		-0.071		-0.032	
sales workers	0.009		0.029		-0.010		0.007		0.013		0.032	
craftsmen	0.028		0.075		0.030		0.076		0.028		0.075	
operatives, except transport	-0.090		-0.052		-0.100		-0.063		-0.089		-0.052	
laborers, except farm	0.099		0.095		0.099		0.097		0.099		0.094	
farmers and farm managers	-0.418	**	-0.423	**	-0.421	**	-0.424	**	-0.414	**	-0.420	**
farm laborers and foremen	-0.277		-0.224		-0.283		-0.236		-0.280		-0.223	
service workers, except private household	0.015		0.021		0.005		0.016		0.010		0.017	
private household workers	-0.256		-0.264		-0.262		-0.276		-0.256		-0.264	
not in labor force	0.430	***	0.432	***	0.433	***	0.435	***	0.429	***	0.431	***
unemployed	0.633	***	0.593	***	0.646	***	0.614	***	0.633	***	0.592	***
bmi					**0.008**	*****	**0.008**	*****				
obese dummy									**0.115**	*****	**0.104**	*****
constant	0.748	**	0.942	***	0.601	*	0.790	**	0.741	**	0.938	***

Table 3: Impact of Obesity on Well Being by Race and Income Quintile

dependent variable: composite depression index
all demographic variables from tables 1 & 2 included, not shown

coefficients and significance of bmi and obesity vars on OLS and random-effects regressions of depression variable

		black		hispanic		other race		all races	
		OLS	random effects	OLS	random effects	OLS	random effects	OLS	random effects
all income quintiles	bmi	0.007	0.005	0.009	0.007	**0.01 ***	**0.011 ***	**0.008 ***	**0.008 ***
	obesity	0.09	0.061	0.015	-0.003	**0.142 ***	**0.137 ***	**0.115 ***	**0.104 ***
income quintile 1	bmi	0.002	0.002	0.032 **	0.03 *	**0.03 ****	**0.03 ****	**0.02 ****	**0.021 ****
	obesity	0.11	0.124	0.283	0.255	**0.467 *****	**0.467 ****	**0.331 *****	**0.339 *****
income quintile 2	bmi	0.007	0.007	0.012	0.014	0.007	0.009	0.006	0.007
	obesity	0.105	0.098	0.1	0.093	0.106	0.119	0.093	0.1
income quintile 3	bmi	0.006	0.005	0.009	0.008	0.014	0.015	0.01	0.011
	obesity	0.14	0.114	0.028	0.067	0.17	0.198	0.143	0.161 *
income quintile 4	bmi	0.002	0.001	0.017	0.015	0.005	0.007	0.006	0.007
	obesity	0.046	0.033	0.14	0.138	0.071	0.074	0.07	0.072
income quintile 5	bmi	0.009	0.008	0.011	0.011	0.011	0.013	0.009	0.011
	obesity	0.075	0.068	0.13	0.131	0.246 *	0.27 *	0.193 *	0.21 *

Table 4: Merge with General Social Survey

dependent variable: obesity dummy

	logit		logit w/ random effects	
age	0.173	***	0.173	***
hispanic	1.639	***	1.640	***
black	0.226		0.225	
grade level	0.015		0.015	
married	0.061		0.061	
separated	-0.858		-0.859	
divorced	-0.728		-0.729	
income quintile 1	1.155	*	1.158	*
income quintile 2	0.173		0.177	
income quintile 4	0.135		0.136	
income quintile 5	-0.976		-0.976	
region: north east	-0.014		-0.014	
region: north central	-0.427		-0.426	
region: west	0.060		0.061	
happiness	0.309		0.310	
constant	-9.089	***	-9.101	***

dependent variable: 1-4 scale of happiness

	income quintile 1		income quintile 2		income quintile 3		income quintile 4		income quintile 5	
	OLS		OLS		OLS		OLS		OLS	
age	0.009		0.010		0.003		-0.010		-0.009	
hispanic	-0.135		0.099		0.616	***	-0.454	*	-0.449	***
black	-0.190		-0.315	*	-0.229	*	-0.187		-0.838	*
grade level	0.081	**	0.008		0.015		0.029		-0.008	
married	0.195		0.079		0.185		0.415	***	0.163	
separated	-0.066		-0.223		(dropped)		0.221		(dropped)	
divorced	-0.092		-0.174		-0.128		0.068		0.272	
region: north east	0.017		0.222		-0.053		-0.130		0.092	
region: north central	0.068		-0.087		0.023		-0.244	**	-0.002	
region: west	0.049		-0.173		0.022		-0.185		0.070	
obesity	0.163		0.233		-0.003		0.202		**-0.370**	**
constant	0.817		1.805	***	1.891	***	2.008	***	2.644	***

Table 5: "Social" BMI

Specification 1	variance from group's mean BMI
Specification 2a	residuals from regression of BMI on demographic variables with random effects
Specification 2b	residuals from OLS regression of BMI on demographic variables
Specification 3	residuals from OLS regression of BMI on status variable

dependent variable: composite depression
regression does not include other demographic controls as
they were used to construct the bmi-extra variable

	OLS		random effects	
bmi-extra (1)	0.012	***	0.006	
bmi-extra (2a)	0.013	***	0.013	**
bmi-extra (2b)	0.011	**	0.011	**
bmi-extra (3)	0.010	***	0.005	

Table 6: Causality

dependent variable: depression

	OLS		OLS		OLS		OLS	
lagged depression	0.415	***	0.415	***	0.415	***	0.415	***
lagged obesity	0.131	**	0.131	**	0.131	**	0.131	**
constant	-0.100	***	-0.100	***	-0.100	***	-0.100	***

dependent variable:	bmi-extra (1)		bmi-extra (2a)		bmi-extra (2b)		bmi-extra (3)		obese	
	OLS		OLS		OLS		OLS		logit	
lagged depression	0.054	*	-0.014		-0.013		0.032	*	0.036	*
lagged bmi-extra (1)	0.819	***								
lagged bmi-extra (2a)			0.95	***						
lagged bmi-extra (2b)					0.947	***				
lagged bmi-extra (3)							0.947	***		
lagged obesity									3.701	***
constant	0.126	***	-0.004		-0.01		0.004		-2.367	***

Table 7: Impact of Obesity on Happiness in Russia

dependent variable:	satlif				satlif (Moscow/St. Pete only)				satlif (Moscow/St. Pete only)			
	OLS		random effects		OLS		random effects		OLS		random effects	
age	-0.008	***	-0.006	***	-0.010	***	-0.010	***	-0.008	***	-0.006	***
male	0.124	***	0.116	***	0.063		0.040		0.116	***	0.111	***
never married	0.152	***	0.173	***	0.152	**	0.147	*	0.152	***	0.172	***
committed relationship	0.162	***	0.189	***	0.041		0.087		0.160	***	0.187	***
divorced	-0.187	***	-0.186	***	-0.129	*	-0.138	*	-0.191	***	-0.189	***
widowed	0.035	*	0.004		-0.006		-0.029		0.033		0.002	
income quintile 1	-0.305	***	-0.243	***	-0.209	**	-0.213	***	-0.307	***	-0.244	***
income quintile 2	-0.152	***	-0.131	***	-0.101		-0.113	*	-0.154	***	-0.132	***
income quintile 4	0.120	***	0.090	***	0.084		0.097	*	0.120	***	0.090	***
income quintile 5	0.316	***	0.241	***	0.328	***	0.279	***	0.316	***	0.241	***
region: Moscow or St. Petersburg	0.196	***	0.214	***					0.195	***	0.214	***
region: North, Northwest	0.031		0.035						0.030		0.035	
region: Volga	-0.045	**	-0.050	*					-0.046	**	-0.051	*
region: North Caucases	-0.022		-0.024						-0.019		-0.022	
region: Urals	-0.106	***	-0.124	***					-0.105	***	-0.124	***
region: West Siberia	-0.153	***	-0.142	***					-0.151	***	-0.140	***
region: East Siberia/Far East	-0.172	***	-0.157	***					-0.171	***	-0.158	***
grade level	-0.006	*	0.004		0.012		0.008		-0.006	*	0.003	
Higher controllers	0.304	***	0.269	***	0.365	***	0.278	***	0.305	***	0.271	***
Lower controllers	0.228	***	0.208	***	0.262	***	0.227	***	0.227	***	0.208	***
Routine non-manual	0.071	**	0.061	*	0.065		0.059		0.072	**	0.062	*
Self-employed	0.319	***	0.273	***	0.128		0.139		0.319	***	0.274	***
semplwithoutempl	0.184	***	0.184	***	0.272		0.365	**	0.185	***	0.185	***
manual supervisor	0.227	***	0.194	**	0.062		0.040		0.229	***	0.195	**
skilled manual labor	0.067	***	0.064	**	0.088		0.123		0.065	**	0.062	**
farmer	-0.195	***	-0.134	***	0.112		0.005		-0.196	***	-0.135	***
not working	0.127	***	0.069	***	0.127	**	0.073		0.129	***	0.070	***
underweight	0.148	***	0.124	***	0.000		0.009					
overweight	0.030	**	0.023		0.087	*	0.088	*				
obese	**0.060**	*******	**0.062**	*******	**0.070**		**0.108**	*****				
bmi									**-0.008**		**-0.017**	*****
bmi squared									**0.000**		**0.000**	*****
constant	2.643	***	2.561	***	2.724	***	2.829	***	2.777	***	2.803	***
N = 56855												

Table 8: Impact of Obesity on Health

	reported health		diabetes		heart attack		trouble walking 1 km	
age	-0.020 ***	-0.020 ***	0.002 ***	0.001 ***	0.002 ***	0.002 ***	0.039 ***	0.039 ***
male	0.178 ***	0.175 ***	-0.017 ***	-0.017 ***	0.021 ***	0.021 ***	-0.076 **	-0.064 *
never married	0.001	0.010	0.018 ***	0.019 ***	0.004 **	0.004 **	0.347 ***	0.343 ***
committed relationship	-0.043 ***	-0.042 ***	0.004	0.004	0.003	0.003	0.000	0.001
divorced	-0.001	0.004	0.006 *	0.006 *	0.003	0.003	0.014	-0.003
widowed	-0.001	0.000	0.009 *	0.010 *	-0.003	-0.003	0.148 ***	0.153 ***
income quintile 1	-0.036 ***	-0.034 ***	-0.002	-0.002	-0.002	-0.002	0.109 **	0.100 **
income quintile 2	-0.026 **	-0.023 **	0.002	0.001	0.000	0.000	0.066	0.052
income quintile 4	0.024 **	0.024 **	-0.001	-0.001	-0.003	-0.003	-0.116 **	-0.123 ***
income quintile 5	0.046 ***	0.045 ***	0.001	0.001	-0.005 **	-0.005 **	-0.095 *	-0.097 *
region: Moscow or St. Petersburg	0.066 ***	0.069 ***	0.000	-0.001	0.010 ***	0.010 ***	-0.091 *	-0.094 *
region: North, Northwest	-0.008	-0.007	-0.005	-0.006	0.014 ***	0.014 ***	-0.020	-0.025
region: Volga	0.051 ***	0.052 ***	-0.022 ***	-0.022 ***	0.001	0.001	-0.015	-0.011
region: North Caucases	0.198 ***	0.196 ***	-0.016 ***	-0.017 ***	-0.001	-0.001	0.226 ***	0.229 ***
region: Urals	0.013	0.013	-0.016 ***	-0.016 ***	-0.001	-0.001	-0.027	-0.026
region: West Siberia	-0.013	-0.013	-0.014 ***	-0.014 ***	0.007 **	0.007 **	0.019	0.018
region: East Siberia/Far East	0.031 **	0.033 **	-0.022 ***	-0.022 ***	0.006 *	0.006 *	0.224 ***	0.215 ***
grade level	0.022 ***	0.021 ***	0.002 **	0.002 **	0.002 ***	0.002 ***	-0.060 ***	-0.060 ***
Higher controllers	0.066 ***	0.064 ***	0.000	0.000	0.003	0.003	-0.130 *	-0.127 *
Lower controllers	0.027 *	0.025 *	-0.003	-0.002	0.004 *	0.004 *	-0.009	0.008
Routine non-manual	0.005	0.003	0.000	0.001	0.010 ***	0.010 ***	0.042	0.054
Self-employed	0.021	0.018	0.001	0.002	0.010 **	0.010 **	0.298 *	0.336 *
Self-employed (no employees)	0.069 *	0.068 *	0.000	0.000	0.001	0.001	0.207	0.221
Manual supervisor	0.022	0.020	-0.014 **	-0.014 **	0.009	0.009	-0.267 *	-0.257 *
Skilled manual labor	0.027 *	0.028 *	-0.005 *	-0.005 *	0.001	0.000	-0.026	-0.025
Farm labor	0.041 *	0.044 *	- *	- **	-	-	-	-

			0.007	0.008	0.002	0.002	0.096	0.122
Independent farmer	0.016	0.010	-0.005	-0.004	0.020	0.020	0.109	0.139
Not working	-0.043 ***	-0.040 ***	0.013 ***	0.014 ***	0.025 ***	0.025 ***	0.455 ***	0.454 ***
underweight	-0.152 ***		0.004		0.007 ***		0.480 ***	
overweight	0.029 ***		0.011 ***		0.005 **		-0.116 ***	
obese	**-0.045 *****		**0.053 *****		**0.008 *****		**0.186 *****	
BMI		**0.074 *****		**-0.003 ***		**-0.001**		**-0.191 *****
BMI squared		**-0.001 *****		**0.000 *****		**0.000**		**0.004 *****
constant	3.666 ***	2.677 ***	-0.049 ***	-0.039 *	-0.090 ***	-0.082 ***	0.138	2.650 ***

all regressions are OLS

Table 9: Lagged Residual Happiness

	happiness			
	OLS		random effects	
lagged satlif residual	-0.211	***	0.083	***
satlif	-0.184	***	0.105	***
constant	26.396	***	25.174	***

Table 10: Gender Differences in Obesity

Dependent variable: obese dummy variable

	male				female			
	logit		logit w/ random effects		logit		logit w/ random effects	
age	0.031	***	0.036	***	0.045	***	0.043	***
never married	-1.324	***	-0.67	***	-1.063	***	-0.561	***
committed relationship	-0.16		-0.124		-0.263	***	-0.129	
divorced	-0.61	***	-0.387	***	-0.336	***	-0.205	***
widowed	-0.527	***	-0.448	**	-0.425	***	-0.335	***
income quintile 1	-0.148		-0.09		-0.119	**	-0.105	***
income quintile 2	0.101		0.018		-0.065		-0.071	**
income quintile 4	-0.02		-0.031		-0.064		-0.023	
income quintile 5	0.2	**	0.085		-0.042		0.01	
region: Moscow or St. Petersburg	-0.066		0.101		-0.353	***	-0.256	**
region: North, Northwest	-0.215		-0.002		0.046		0.165	
region: Volga	-0.145		-0.273	*	-0.171	***	-0.133	
region: North Caucases	0.523	***	0.397	**	0.321	***	0.281	**
region: Urals	-0.413	***	-0.463	**	-0.062		-0.049	
region: West Siberia	0.049		0.157		0.093		0.165	
region: East Siberia/Far East	-0.105		-0.287		0.107		0.006	
grade level	0.033	*	0.03		0.066	***	0.037	**
Higher controllers	0.157		0.208		-0.465	***	-0.01	
Lower controllers	0.056		0.141		-0.267	***	-0.006	
Routine non-manual	0.278		0.236		-0.129	*	-0.015	
Self-employed	0.101		0.209		0.025		0.153	
semplwithoutempl	0.171		0.114		-0.129		0.008	
manual supervisor	0.25		0.061		0.741	***	0.267	*
skilled manual labor	-0.188	*	-0.051		-0.025		0.043	
farmer	-0.076		-0.026		0.176		-0.405	*
notworking	-0.316	***	-0.15		-0.395	***	-0.069	
happiness	**0.063**	****	**0.046**	****	**-0.001**		**0.006**	
constant	-3.677	***	-3.991	***	-3.191	***	-3.301	***

Table 11: Skills Valued?

dependent variable: bmi	men				women			
	OLS		random effects		OLS		random effects	
age	0.072	***	0.096	***	0.154	***	0.145	***
never married	-1.923	***	-1.019	***	-2.036	***	-1.176	***
committed relationship	-0.541	***	-0.470	***	-0.925	***	-0.367	**
divorced	-1.122	***	-0.583	***	-1.045	***	-0.487	***
widowed	-1.118	***	-0.878	***	-1.434	***	-0.905	***
income quintile 1	-0.212	*	-0.012		-0.194		-0.203	***
income quintile 2	0.023		0.037		-0.057		-0.102	
income quintile 4	0.042		0.068		-0.003		-0.002	
income quintile 5	0.380	***	0.107		-0.002		0.067	
region: Moscow or St. Petersburg	-0.024		0.242		-0.868	***	-0.661	**
region: North, Northwest	0.012		0.042		0.104		0.374	
region: Volga	-0.232	*	-0.352	*	-0.501	***	-0.388	
region: North Caucases	1.112	***	0.871	***	0.767	***	0.809	***
region: Urals	-0.409	***	-0.342	*	-0.071		0.033	
region: West Siberia	0.016		0.102		0.073		0.167	
region: East Siberia/Far East	-0.285	*	-0.308		0.023		-0.106	
grade level	0.168	***	0.179	***	0.188	***	0.077	**
Higher controllers	0.506	***	0.296	**	-0.995	***	0.065	
Lower controllers	0.335	*	0.218		-0.604	***	0.007	
Routine non-manual	-0.210		0.081		-0.320		-0.075	
Self-employed	0.005		0.086		-0.491		0.002	
semplwithoutempl	0.030		-0.074		-0.995		-0.520	*
manual supervisor	0.237		0.222		1.731	**	-0.068	
skilled manual labor	-0.408	***	-0.064		0.179		0.009	
not working	-0.860	***	-0.338	***	-1.125	***	-0.162	
skills valued?	**0.152**	*******	**0.065**	*******	**0.019**		**0.006**	
constant	20.689	***	19.349	***	19.709	***	19.841	***

Table 12: Status

dependent variable: happiness

	OLS		OLS		OLS		OLS	
bmiextra	**-0.01**	*******	**0.006**	*******	**-0.011**	*******	**-0.002**	
status					**0.35**	*******	**0.318**	*******
age			-0.008	***			-0.004	***
male			0.127	***			0.083	***
never married			0.165	***			0.156	***
committed relationship			0.163	***			0.162	***
divorced			-0.188	***			-0.106	***
widowed			0.025				0.017	
income quintile 1			-0.31	***			-0.203	***
income quintile 2			-0.152	***			-0.099	***
income quintile 4			0.126	***			0.092	***
income quintile 5			0.317	***			0.219	***
region: Moscow or St. Petersburg			0.194	***			0.158	***
region: North, Northwest			0.018				-0.03	
region: Volga			-0.031	*			-0.057	***
region: North Caucases			-0.018				-0.193	***
region: Urals			-0.097	***			-0.12	***
region: West Siberia			-0.157	***			-0.198	***
region: East Siberia/Far East			-0.167	***			-0.177	***
grade level			-0.006				-0.02	***
Higher controllers			0.301	***			0.144	***
Lower controllers			0.23	***			0.104	***
Routine non-manual			0.068	**			0.014	
Self-employed			0.319	***			0.184	***
semplwithoutempl			0.195	***			0.15	**
manual supervisor			0.211	***			0.102	
skilled manual labor			0.07	***			0.053	**
farmer			-0.184	***			-0.124	***
not working			0.147	***			0.104	***
constant	2.474	***	2.69	***	2.472	***	2.717	***