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An empirical note on imitative obesity and a puzzling result

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Abstract:

Using data from the Behavioral Risk Factor Surveillance System for 2006, I test recent theoretical predictions on social comparisons influencing individual Body Mass Index (BMI). I find that in particular the average BMI of individuals in the same county-age-gender-cell as the respective individual influences BMI. Evidence from quantile regressions points towards significant heterogeneity of effects along the distribution. However, there is no evidence of some individuals becoming slimmer as a result of preferences for deviant behaviour. Life satisfaction regressions show a positive effect for BMI relative to the county average. Paradoxically, BMI relative to the cell average seems to have no effect on life satisfaction. These two results contradict most theories of social comparisons.

Keywords: imitative obesity, relative obesity, social contagion, comparison, weight, BMI, life satisfaction

JEL Classification: D1, I12, I31

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All analyses used Stata 11. Do-Files are available from the author on request.

I. INTRODUCTION

Rising obesity is a growing problem in many developed countries (see, e.g., Cutler et al, 2003; Brunello et al., 2009). Contributions by economists have examined the role of changing (food) prices (e.g, Chou et al, 2004; Offer, 2006) and changing eating habits (e.g., De Agostino, 2007) as well as the role of micro-level factors as the local supply of physicians (Morris and Gravelle, 2008).

Recent research has emphasized the role of social comparisons and norms. Etilé (2007) presents evidence that social norms – in this case perceptions about the ideal weight in a person’s reference group – influence individual ideas about ideal weight. Burke and Heiland (2007) construct a theoretical model in the same spirit. In two recent papers, Oswald and Powdthavee (2007) and Blanchflower et al. (2009) have emphasized explanations based on individuals possessing preferences about their weight relative to that of their peers. If individuals gain utility from their relative standing in the weight distribution, imitative obesity spirals where individuals become fatter as a result of everyone else becoming fatter might arise. An interesting twist in Oswald and Powdthavee (2007) is that depending on the curvature of the utility function their theory can also explain the rise in extreme slimness, e.g., anorexia, which seems to go hand in hand with increases in obesity in many countries. Specifically, depending on whether an individual’s preferences are convex or concave in relative weight, it becomes optimal to either follow or deviate from the behavior of the majority. Evidence for the importance of such comparisons has already been found for, e.g., (relative) income (e.g., Clark et al., 2008; Clark et al., 2009) or unemployment (Clark, 2003; Knabe et al., 2010). Graham and Felton (2005) present cross-country evidence in favor of norm-based explanations, while Maximova et al (2008) present evidence that childrens’ and adolescents’ weight perceptions depend on the weight of their parents and peers. Similar

evidence for peer effects on actual weight is found by Trogdon et al. (2008). Ellaway et al. (1997) emphasize the role of neighborhoods, which may also point towards peer effects.

In this paper, I test some of the predictions from Oswald and Powdthavee (2007) on US data from the Behavioral Risk Factor Surveillance System for 2006, specifically, that individual weight is influenced by reference group weight, that these effects differ across the distribution with some people actually getting thinner as a result of reference group weight increases, and that life-satisfaction is (negatively) influenced by relative BMI. In a first step, I demonstrate that individual BMI is influenced (a) by the respective county's average BMI and (b) and probably more interesting to an even stronger degree by the average BMI of people in the same county-gender-age cell than the respective individual. A potential problem with these cross-sectional estimates could be the sorting of overweight individuals into certain areas. To attenuate these concerns, I add a large set of regional controls and also look at the effects of average cell BMI, which should be closer to reference group BMI, while holding county BMI constant. These corrections basically strengthen the positive effect of average cell group BMI on individual BMI, which makes a behavioural explanation in the spirit of Oswald and Powdthavee (2007) more likely. In other words, individuals tend to gain weight if people similar to them become fatter, even when holding county wide trends in obesity constant.

I then turn to the question whether there is evidence that some individuals decide to become slimmer as a result of their environment becoming more obese. Here, evidence from quantile regressions, while pointing towards significant heterogeneity of effects along the BMI distribution, shows no evidence of a negative effect of average on individual BMI at the lower end of the distribution (as low as the 3% quantile, below this quantile regression estimates encounter convergence problems). The results suggest that increases in average BMI tend to widen the BMI distribution in addition to shifting it to the right.

Finally, I present evidence from life satisfaction regressions, which seems to contradict the main idea of Oswald and Powdthavee (2007) as well as the cross-sectional

evidence in Blanchflower et al. (2009): Own BMI enters negatively into life satisfaction with stronger effects being found for women, while BMI relative to the county average actually has a positive effect on life satisfaction. Paradoxically, BMI relative to the cell average is basically unrelated to life satisfaction. These two findings are puzzling as they seem to indicate that people actually prefer to be heavier than the average person in the same region, while they do not seem to care about their weight relative to similar people.

Section 2 describes the data, section 3 presents results for the relationship between aggregate and individual BMI, section 4 is concerned with the effects on life satisfaction and section 5 concludes.

II. DATA

The data used come from the Behavioral Risk Factor Surveillance System (BRFSS) for 2006, collected jointly by the centers for Disease Control and Prevention (CDC) and U.S. states and territories, specifically the respective health departments.¹ The data cover the adult population above 18 years of age living in households. As a stratified sampling design is used all following analyses use the weights supplied with the data. Furthermore, I also use the BRFSS county variables supplement for 2006, which contains information on a number of potential county level confounders.

From the data, I first calculate individual BMI as weight in kilogram divided by the size in meters squared.² I then use this information to calculate county averages and the average BMI in county-gender-age-cells with age measured in 10 year intervals. Both of these can be seen as potential reference weights for individuals. Choosing the “right” reference group is in fact somewhat tricky as it is a priori unknown to whom a certain individual compares itself (see Clark et al., 2008, for a discussion of this point in the context of income

¹ See <http://www.cdc.gov/BRFSS/> for further information and the data.

² Note that this measure of BMI is based on self-reported weight, which may be problematic when overweight people tend to underreport their weight. Chou et al. (2004) use several corrections. They report a correlation exceeding 0.99 between corrected and uncorrected BMI, which can be seen as evidence that the problem is not severe (Chou et al., 2004, p. 572).

comparisons). The approach taken here effectively means choosing a reference group within a relatively small region around the respective individual (county average) and in second step also adds the requirement that individuals only compare themselves to individuals of a roughly similar age and with the same sex. I also calculate relative individual BMI as individual BMI/average BMI (*100).

The data also contain information on life satisfaction on a four point scale. This variable has been recoded such that higher values represent higher levels of life satisfaction, which eases the interpretation of the later estimates.

From the data I also take a set of individual controls, specifically education in four categories, age, dummies for marital status and for being black, Asian and of other non-white races, dummies for having one, two or three or more children and dummies for household income and labour force status. I furthermore use a set of county variables taken from the supplement file available with the individual data. These are often lagged by one to several years due to data availability, which also attenuates concerns regarding simultaneity as a side effect. These variables are the county population and the shares of blacks and Hispanics, the percentage of the population living below the poverty line, dummies for having less than 65% of the working age population in employment and for at least 25% of the population between 25 and 64 not having either a high-school diploma or a GED, a dummy indicating whether the county lost inhabitants from both 1980 to 1990 and from 1990 to 2000, the number of fast-food restaurants per 100,000 inhabitants, the respective number of liquor stores and fitness centers per 100,000 inhabitants and a dummy indicating whether 30% or more percent of the county's households lacked complete plumbing, lacked a complete kitchen, paid 30 percent or more of income for owner costs or rent, or had more than 1 person per room. A full documentation including data sources can be found in BRFSS (2007).

After dropping observations with missing variables, I end up with samples of 93,302 men and 138,138 women. Descriptive statistics for both samples can be found in table 1.

[TABLE 1 AROUND HERE.]

III. REFERENCE GROUP AND INDIVIDUAL BMI

In this section, I present evidence that there is a positive relationship between average and individual BMI that is stronger for average cell BMI than for average county BMI and that also persists when controlling for county level confounders. In a first step, I run regression of individual BMI on a set of control variables and aggregate BMI.

[TABLE 2 AROUND HERE.]

Table 2 presents evidence from these regressions. Columns (1) and (2) are calculated without further regional controls and with only one measure of aggregate BMI. In both columns and for both men and women, we observe a positive relationship between aggregate and individual BMI. These effects are generally larger when looking at cell averages, which can be seen as a first hint that this is indeed a social comparison effect. However, the results from both columns can be plagued by selection problems if overweight individuals sort into regions, where more overweight individuals live or where the local infrastructure suits their preferences. Both effects could generate an upward bias in the estimates for aggregate BMI.

To mitigate these concerns, I rely on two strategies. First, I use a large set of regional controls, which can be expected to capture part of the selection effects, e.g., information about regional poverty and education or information about the local infrastructure like the number of fast food restaurants. Results from these estimates are shown in columns (4) and (5). The results from these estimations are generally very similar to the previous estimates for cell average BMI and are generally somewhat larger for county average BMI.

In a second step, I enter both county and cell average BMI into the regressions. The former can be seen as a control for the selection of overweight individuals into a certain county while the latter gives the effect of changes in reference group BMI. The inclusion of county average BMI as an additional control, barely changes the estimates for cell average BMI. In other words, the results seem to indicate that people tend to be heavier when people similar to them (and around them) are heavier, even when holding regional differences in weight constant. Interestingly, when controlling for cell average BMI the relationship between county average and individual BMI becomes negative. One potential explanation for these effects could be that overweight individuals are aware of their preferences over relative weight and try to select into regions where they are relatively thinner, while nevertheless being influenced by the weight of people similar to them.

In the next step, I focus on effect heterogeneity across the BMI distribution. The theory on Oswald and Powdthavee (2007) allows for some individuals rationally becoming slimmer, while everyone around them becomes fatter. This effect is driven by the curvature of the utility function with respect to relative BMI. In particular, individuals whose preferences are convex with respect to relative BMI gain utility by deviating from the behavior of the majority. For them optimal behavior would be to “diet in the face of social gluttony” (Oswald and Powdthavee, 2007, p. F448). Note that we would expect to find these people at the lower end of the BMI distribution in the cross-section. In other words, we would expect increases in aggregate BMI to have positive effects among relatively obese people and maybe a negative effect on people who are already relatively slim. To check for the existence of these effects, I rely on quantile regressions, which allow me to model the relationship between aggregate and individual BMI on several points of the (conditional) BMI distribution.

[TABLE 3 AROUND HERE.]

Results from this exercise can be found in table 3. Each cell in the respective top panel of this table comes from a separate regression, containing only one type of aggregate BMI in addition to individual and regional controls. In the respective lower panel, both county and cell average BMI are entered into the regression. The results using only one type of aggregate BMI how clear increases in the effects of aggregate on individual BMI when we go from the lower to the upper end of the BMI distribution. From the 75% quantile (women) or the 90% quantile (men), individuals show disproportionately high increases in BMI in response to increases in aggregate BMI. However, even at the lower end of the distribution, in this case the 3% quantile, which was the lowest quantile where the regressions did not run into convergence problems, individuals still tend to increase their weight when aggregate BMI increases. In other words, increase in aggregate BMI (a) shift the BMI distribution to the right through increases over all quantiles and (b) at the same time widen the distribution through disproportionate increases at the upper end of the distribution.

If one adds again both types of aggregate BMI, we see the already familiar picture from the OLS regressions: Point estimates for average county BMI are usually negative, although not always significant, and are typically relatively similar across the distribution, while the effects of average cell BMI are practically identical to the previous estimates not controlling for average county BMI.

IV. RELATIVE BMI AND LIFE SATISFACTION

In this section, I investigate the relationship between individual and relative BMI and life satisfaction. The specification used, including a second order polynomial in individual BMI and relative BMI, is identical to the one used by Blanchflower et al. (2009). Unfortunately, I cannot replicate their findings based on fixed effects estimators (see Blanchflower et al., 2009, p .535) due to the lack of panel data. All estimates again contain

individual and regional control variables. The life satisfaction variable available in the data has been recoded such that positive coefficients indicate increases in life satisfaction.

[TABLE 4 AROUND HERE.]

Table 4 shows results from ordered probit regressions. For men, the results generally show a negative relationship between individual BMI and life satisfaction, although the effects are only strongly determined when county average BMI is included. For women, we always observe decreases in life satisfaction when individual BMI increases. The results in columns (2), (3) and (4) indicate that individuals' life satisfaction is higher when having a high weight relative to the county average, while no such relationship can be found for the cell average. This finding provides evidence that relative weight matters for life satisfaction, but deviates from the results in the previous section where cell average BMI was found to have a stronger, but otherwise relatively similar effect on individual BMI than county average BMI. These findings are somewhat puzzling as they seem to indicate that people actually prefer to be heavier than the average person in the same region, while they do not seem to care about their weight relative to similar people. This result is particularly puzzling given the evidence from the previous section, specifically that a positive relationship between individual and average BMI exists primarily for cell-average BMI.

V. CONCLUSION

Recent evidence has suggested that individual obesity may depend in parts on social comparisons or social norms. In this case, increases in obesity may reinforce themselves as some individuals follow the herd and gain weight in response to everyone else gaining weight. These theories can also explain the existence of very slim individuals at the same time, who owe their existence to a utility function that makes deviant behaviour optimal and who consequently become thinner as their environment gains weight.

In this paper, I tested some implications from these theories using data from the Behavioral Risk Factor Surveillance System for 2006. I find that that individual BMI is influenced by aggregate BMI, using both county average BMI and the average BMI of people in the same county-gender-age cell as the respective individual. Using both measures, I find that there is in fact a negative relationship between county average and individual BMI, which can be explained by heavy people sorting into regions with even heavier people to avoid the disutility from comparisons. Average cell BMI still shows a strong positive relationship with individual BMI. All effects persist when controlling for several county characteristics. Further evidence from quantile regressions points towards significant heterogeneity of effects along the BMI distribution, but shows no evidence for a negative effect of average on individual BMI at the lower end of the distribution. These results suggest that increases in average BMI tend to widen the BMI distribution in addition to shifting it to the right. Finally, evidence from life satisfaction regressions points towards a paradox: While own BMI enters negatively into life satisfaction, BMI relative to the county average has a positive effect. Paradoxically, BMI relative to the cell average seems to have no effect on life satisfaction. In other words, while people prefer to be slim, they also like to be heavier than the average person in the same region, while they do not seem to care about their weight relative to similar people. None of these results is particularly favorable towards preferences over relative BMI leading to obesity spirals.

Taken together the results support the view that (a) there is indeed a relation between aggregate and individual BMI that is stronger for the BMI of people similar to the individual under question and (b) that relationship seems to be more complicated than predicted by simple preferences about relative BMI.

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Table 1: Descriptive statistics, both samples

	<u>Men</u>		<u>Women</u>	
	Mean	Std.dev.	Mean	Std.dev.
BMI	27.844	5.090	27.123	6.357
BMI, county average	27.395	0.796	27.426	0.800
BMI, cell average	27.844	1.728	27.123	1.888
BMI, relative to county average	101.661	18.423	98.878	22.847
BMI, relative to cell average	100.000	16.910	100.000	22.041
Life satisfaction	3.410	0.617	3.393	0.628
High-school dropout (1 = yes)	0.084	0.277	0.083	0.275
Some college (1 = yes)	0.246	0.431	0.285	0.451
College graduate (1 = yes)	0.396	0.489	0.345	0.475
Married (1 = yes)	0.629	0.483	0.515	0.500
Cohabiting (1 = yes)	0.028	0.166	0.026	0.159
Divorced (1 = yes)	0.127	0.333	0.162	0.369
Widowed (1 = yes)	0.054	0.226	0.151	0.358
Separated (1 = yes)	0.019	0.136	0.026	0.160
One child (1 = yes)	0.125	0.331	0.143	0.350
Two children (1 = yes)	0.122	0.327	0.134	0.341
Three or more children (1 = yes)	0.068	0.251	0.080	0.272
Annual household income <10,000 \$	0.033	0.179	0.060	0.238
Annual household income 10,000-15,000 \$	0.040	0.197	0.068	0.252
Annual household income 15,000-20,000 \$	0.057	0.231	0.084	0.277
Annual household income 20,000-25,000 \$	0.079	0.270	0.099	0.299
Annual household income 25,000-35,000 \$	0.122	0.327	0.130	0.336
Annual household income 50,000-75,000 \$	0.191	0.393	0.164	0.370
Self-employed (1 = yes)	0.125	0.330	0.068	0.252
Not working for more than one year (1 = yes)	0.014	0.119	0.018	0.132
Not working for less than one year (1 = yes)	0.021	0.143	0.021	0.144
Unable to work (1 = yes)	0.051	0.220	0.061	0.240
Other employment (1 = yes)	0.253	0.435	0.349	0.477
Age (years)	51.790	16.094	51.867	16.642
Black (1 = yes)	0.069	0.253	0.097	0.296
Asian (1 = yes)	0.022	0.147	0.018	0.134
Other non-white (1 = yes)	0.054	0.226	0.052	0.221
County population in 2006	463867.406	801681.000	466995.813	796985.125
Share of blacks in population, 2004	5.439	7.352	5.870	7.682
Share of Hispanics in population, 2004	4.361	5.687	4.377	5.851
25 percent or more of residents 25 through 64 years old had neither a high school diploma nor GED in 2000 (1 = yes)	0.062	0.241	0.068	0.252
Less than 65 percent of residents 21 through 64 years old were employed in 2000 (1 = yes)	0.069	0.253	0.077	0.267
30 percent or more of households had one or more of these housing conditions in 2000: lacked complete plumbing, lacked complete kitchen, paid 30 percent or more of income for owner costs or rent, or had more than 1 person per room. (1 = yes)	0.388	0.487	0.386	0.487
Share of population below poverty line, 2004	12.007	4.121	12.262	4.233
Number of residents declined both between the 1980 and 1990 censuses and between the 1990 and 2000 censuses. (1 = yes)	0.083	0.276	0.088	0.283
Fast food restaurants (NAICS Industry Code 72221) per 100,000 population in 2005	89.138	24.074	88.937	24.007
Fitness centers/recreation sports centers (NAICS Industry Code 713940) per 100,000 population in 2005.	11.787	5.832	11.639	5.583
Liquor stores (NAICS Industry Code 445310) per 100,000 population in 2005.	11.411	8.062	11.341	7.970
Observations				

Table 2: Own and reference group BMI, OLS estimates

	(1)	(2)	(3)	(4)	(5)	(6)
			Men			
Average county BMI	0.5788*** (0.0426)		-0.1236*** (0.0241)	0.6346*** (0.0493)		-0.0760*** (0.0269)
Average cell BMI		0.9358*** (0.0132)	0.9531*** (0.0131)		0.9454*** (0.0134)	0.9520*** (0.0133)
Observations	93,302	93,302	93,302	93,302	93,302	93,302
R ²	0.0793	0.1835	0.1838	0.0808	0.1839	0.1840
			Women			
Average county BMI	0.7863*** (0.0374)		-0.2694*** (0.0315)	0.9217*** (0.0465)		-0.1078** (0.0426)
Average cell BMI		0.8213*** (0.0159)	0.8764*** (0.0150)		0.8764*** (0.0142)	0.8905*** (0.0132)
Observations	138,138	138,138	138,138	138,138	138,138	138,138
R ²	0.1085	0.1627	0.1636	0.1096	0.1657	0.1658
Individual controls	yes	yes	yes	Yes	yes	yes
Regional controls	no	no	no	Yes	yes	yes

Coefficients, standard errors adjusted for clustering on the county level in parentheses. All estimates are weighted using the provided weights. ***/*** denote statistical significance on the 10%, 5% and 1% level. Full estimation results can be found in tables A.1 and A.2 in the appendix. Individual controls are education, age, household income, marital status, children, race, age and age squared and labor force status. Regional controls are the county population and the shares of blacks and , the percentage of the population living below the poverty line, dummies for having less than 65% of the working age population in employment and for at least 25% of the population between 25 and 64 not having either a high-school diploma or a GED, a dummy indicating whether the county lost inhabitants from both 1980 to 1990 and from 1990 to 2000, the number of fast-food restaurants per 100,000 inhabitants, the respective number of liquor stores and fitness centers per 100,000 inhabitants and a dummy indicating whether 30% or more percent of the county's households lacked complete plumbing, lacked a complete kitchen, paid 30 percent or more of income for owner costs or rent, or had more than 1 person per room.

Table 3: Own and reference group BMI, quantile regression estimates

	3% quantile	10% quantile	25% quantile	50% quantile	75% quantile	90% quantile
Men						
<u>One factor at a time</u>						
Average county BMI	.2599*** (.0489)	.3397*** (.0301)	.4423*** (.0250)	.5800*** (.0291)	.7147*** (.0373)	1.0388*** (.0648)
Average cell BMI	.3806*** (.0202)	.4655*** (.0145)	.5778*** (.0101)	.8106*** (.0103)	1.0818*** (.0148)	1.4774*** (.0225)
<u>Both factors jointly</u>						
Average county BMI	-0.1116* (0.0614)	-0.1273*** (0.0431)	0.0137 (0.0406)	-0.0271 (0.0383)	-0.1025** (0.0522)	-0.1306** (0.0524)
Average cell BMI	0.4044*** (0.0231)	0.4948*** (0.0148)	0.5871*** (0.0142)	0.8361*** (0.0143)	1.1070*** (0.0188)	1.5061*** (0.0225)
Observations	93,302	93,302	93,302	93,302	93,302	93,302
Women						
<u>One factor at a time</u>						
Average county BMI	.2767*** (.0401)	.3923*** (.0238)	.5528*** (.0239)	.8353*** (.0257)	1.1714*** (.0376)	1.6198*** (.0643)
Average cell BMI	.2500*** (.0117)	.3495*** (.0103)	.4990*** (.0083)	.7686*** (.0107)	1.0901*** (.0171)	1.4751*** (.0224)
<u>Both factors jointly</u>						
Average county BMI	-0.0289 (0.0340)	-0.0062 (0.0343)	-0.0495*** (0.0185)	-0.0521 (0.0355)	-0.0566 (0.0718)	-0.1027 (0.0921)
Average cell BMI	0.2533*** (0.0129)	0.3381*** (0.0123)	0.4877*** (0.0065)	0.7641*** (0.0131)	1.0840*** (0.0251)	1.4683*** (0.0319)
Observations	138,138	138,138	138,138	138,138	138,138	138,138
Individual controls	yes	yes	yes	Yes	yes	yes
Regional controls	yes	yes	yes	Yes	yes	yes

Coefficients, bootstrapped standard errors (200 replications) in parentheses. All estimates are weighted using the provided weights. */**/** denote statistical significance on the 10%, 5% and 1% level. Full estimation results are available on request. Individual controls are education, age, household income, marital status, children, race, age and age squared and labor force status. Regional controls are the county population and the shares of blacks and , the percentage of the population living below the poverty line, dummies for having less than 65% of the working age population in employment and for at least 25% of the population between 25 and 64 not having either a high-school diploma or a GED, a dummy indicating whether the county lost inhabitants from both 1980 to 1990 and from 1990 to 2000, the number of fast-food restaurants per 100,000 inhabitants, the respective number of liquor stores and fitness centers per 100,000 inhabitants and a dummy indicating whether 30% or more percent of the county's households lacked complete plumbing, lacked a complete kitchen, paid 30 percent or more of income for owner costs or rent, or had more than 1 person per room.

Table 4: BMI and life satisfaction, ordered probit estimates

	(1)	(2)	(3)	(4)
Men				
BMI	-0.0021 (0.0047)	-0.0229*** (0.0086)	-0.0039 (0.0058)	-0.0224*** (0.0087)
BMI squared	-0.0001* (0.0001)	-0.0001* (0.0001)	-0.0001* (0.0001)	-0.0001* (0.0001)
BMI relative to county average		0.0057*** (0.0019)		0.0060*** (0.0020)
BMI relative to gender-age-county-cell average			0.0004 (0.0008)	-0.0004 (0.0008)
Marginal effects for being in highest category				
BMI	-.0008 (.0019)	-.0091*** (.0034)	-.0015 (.0023)	-.0089*** (.0034)
BMI squared	-.0001* (.0000)	-.0001* (.0000)	-.0001* (.0000)	-.0001* (.0000)
BMI relative to county average		.0023*** (.0008)		.0024*** (.0008)
BMI relative to gender-age-county-cell average			.0002 (.0003)	-.0002 (.0003)
Observations	93,302	93,302	93,302	93,302
Women				
BMI	-0.0099*** (0.0026)	-0.0274*** (0.0062)	-0.0121*** (0.0033)	-0.0275*** (0.0062)
BMI squared	-0.0000 (0.0000)	-0.0000 (0.0000)	-0.0000 (0.0000)	-0.0000 (0.0000)
BMI relative to county average		0.0048*** (0.0016)		0.0051*** (0.0018)
BMI relative to gender-age-county-cell average			0.0006 (0.0006)	-0.0003 (0.0006)
Marginal effects for being in highest category				
BMI	-.0039*** (.0010)	-.0108*** (.0025)	-.0048*** (.0013)	-.0109*** (.0025)
BMI squared	-.0000 (.0000)	-.0000 (.0000)	-.0000 (.0000)	-.0000 (.0000)
BMI relative to county average		.0019*** (.0001)		.0020*** (.0007)
BMI relative to gender-age-county-cell average			.0002 (.0002)	-.0001 (.0002)
Observations	138,138	138,138	138,138	138,138
Individual controls	yes	yes	yes	yes
Regional controls	yes	yes	yes	yes

Coefficients, standard errors adjusted for clustering on the county level in parentheses. All estimates are weighted using the provided weights. */**/** denote statistical significance on the 10%, 5% and 1% level. Full estimation results can be found in tables A.3 and A.4 in the appendix. Individual controls are education, age, household income, marital status, children, race, age and age squared and labor force status. Regional controls are the county population and the shares of blacks and , the percentage of the population living below the poverty line, dummies for having less than 65% of the working age population in employment and for at least 25% of the population between 25 and 64 not having either a high-school diploma or a GED, a dummy indicating whether the county lost inhabitants from both 1980 to 1990 and from 1990 to 2000, the number of fast-food restaurants per 100,000 inhabitants, the respective number of liquor stores and fitness centers per 100,000 inhabitants and a dummy indicating whether 30% or more percent of the county's households lacked complete plumbing, lacked a complete kitchen, paid 30 percent or more of income for owner costs or rent, or had more than 1 person per room.

APPENDIX: NOT NECESSARILY FOR PUBLICATION

Table A1: BMI estimates, OLS, male sample

	No regional controls				Regional controls			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Average county BMI		0.5788*** (0.0426)		-0.1236*** (0.0241)		0.6346*** (0.0493)		-0.0760*** (0.0269)
Average cell BMI			0.9358*** (0.0132)	0.9531*** (0.0131)			0.9454*** (0.0134)	0.9520*** (0.0133)
High school dropout	0.0725 (0.1533)	0.1285 (0.1516)	0.2312 (0.1484)	0.2222 (0.1472)	0.1390 (0.1557)	0.1559 (0.1555)	0.2209 (0.1476)	0.2194 (0.1475)
Some college	0.1387 (0.1112)	0.1848* (0.1103)	0.1642* (0.0994)	0.1548 (0.0997)	0.1804* (0.1080)	0.2008* (0.1075)	0.1600 (0.0987)	0.1574 (0.0988)
College graduate	-0.8160*** (0.0852)	-0.6819*** (0.0864)	-0.5761*** (0.0817)	-0.6003*** (0.0822)	-0.7032*** (0.0832)	-0.6396*** (0.0832)	-0.5892*** (0.0808)	-0.5960*** (0.0811)
Married	1.0609*** (0.1285)	0.9932*** (0.1267)	0.7808*** (0.1009)	0.7901*** (0.1012)	0.9983*** (0.1274)	0.9717*** (0.1260)	0.7885*** (0.1011)	0.7902*** (0.1012)
Cohabiting	0.2695 (0.2426)	0.2755 (0.2370)	0.0460 (0.2107)	0.0406 (0.2116)	0.3059 (0.2396)	0.2876 (0.2376)	0.0358 (0.2123)	0.0361 (0.2125)
Divorced	0.4988*** (0.1716)	0.4368*** (0.1688)	0.2368* (0.1403)	0.2452* (0.1404)	0.4370*** (0.1663)	0.4161** (0.1653)	0.2440* (0.1393)	0.2452* (0.1393)
Widowed	0.9978*** (0.1939)	0.9122*** (0.1945)	0.6875*** (0.1773)	0.7001*** (0.1775)	0.9338*** (0.1955)	0.8983*** (0.1942)	0.7005*** (0.1766)	0.7031*** (0.1768)
Separated	0.2904 (0.2614)	0.2686 (0.2655)	0.2582 (0.2436)	0.2622 (0.2425)	0.2773 (0.2697)	0.2892 (0.2691)	0.2647 (0.2429)	0.2632 (0.2426)
One child	-0.1969* (0.1006)	-0.1790* (0.1019)	-0.1538 (0.0950)	-0.1569* (0.0948)	-0.1778* (0.1003)	-0.1737* (0.1003)	-0.1538 (0.0936)	-0.1541* (0.0936)
Two children	-0.1353 (0.1141)	-0.1283 (0.1113)	-0.1159 (0.0877)	-0.1170 (0.0877)	-0.1342 (0.1129)	-0.1410 (0.1119)	-0.1186 (0.0882)	-0.1177 (0.0882)
Three or more children	0.0345 (0.1326)	0.0321 (0.1312)	-0.0030 (0.1182)	-0.0032 (0.1183)	0.0256 (0.1320)	0.0170 (0.1317)	-0.0047 (0.1177)	-0.0039 (0.1177)
Annual household income <10,000 \$	-0.5220* (0.2946)	-0.5535* (0.2878)	-0.4249* (0.2466)	-0.4164* (0.2470)	-0.5275* (0.2894)	-0.5191* (0.2869)	-0.4094 (0.2488)	-0.4095 (0.2490)
Annual household income 10,000-15,000 \$	-0.0696 (0.3139)	-0.0792 (0.3018)	0.0109 (0.2786)	0.0145 (0.2802)	-0.0692 (0.3049)	-0.0352 (0.3014)	0.0296 (0.2815)	0.0263 (0.2816)
Annual household income 15,000-20,000 \$	-0.2327 (0.2165)	-0.2982 (0.2239)	-0.2033 (0.2080)	-0.1888 (0.2070)	-0.2763 (0.2252)	-0.2690 (0.2269)	-0.1784 (0.2081)	-0.1785 (0.2077)

Annual household income 20,000-25,000 \$	0.0673 (0.1536)	0.0108 (0.1524)	-0.0850 (0.1540)	-0.0757 (0.1536)	0.0287 (0.1515)	0.0336 (0.1520)	-0.0644 (0.1530)	-0.0656 (0.1531)
Annual household income 25,000-35,000 \$	-0.2687** (0.1233)	-0.3186*** (0.1227)	-0.2332* (0.1207)	-0.2219* (0.1207)	-0.3118** (0.1209)	-0.3073** (0.1208)	-0.2143* (0.1207)	-0.2141* (0.1207)
Annual household income 50,000-75,000 \$	0.1474 (0.0941)	0.1014 (0.0947)	0.0979 (0.0858)	0.1069 (0.0860)	0.1089 (0.0955)	0.0974 (0.0954)	0.1082 (0.0866)	0.1096 (0.0866)
Self-employed	-0.5344*** (0.1179)	-0.4999*** (0.1193)	-0.4102*** (0.1249)	-0.4153*** (0.1249)	-0.5138*** (0.1145)	-0.4936*** (0.1170)	-0.4125*** (0.1238)	-0.4142*** (0.1237)
Not working for more than one year	0.1640 (0.2604)	0.1742 (0.2608)	0.2929 (0.2948)	0.2931 (0.2949)	0.2114 (0.2607)	0.1905 (0.2577)	0.2856 (0.2909)	0.2887 (0.2913)
Not working for less than one year	0.4596 (0.2974)	0.4482 (0.2931)	0.3788 (0.2612)	0.3798 (0.2615)	0.4631 (0.2906)	0.4490 (0.2891)	0.3787 (0.2613)	0.3798 (0.2613)
Unable to work	1.3226*** (0.2281)	1.2269*** (0.2241)	1.0295*** (0.2009)	1.0445*** (0.2011)	1.2562*** (0.2266)	1.2182*** (0.2244)	1.0438*** (0.2016)	1.0468*** (0.2017)
Other employment	0.0153 (0.1203)	-0.0023 (0.1183)	0.0058 (0.0985)	0.0094 (0.0986)	0.0060 (0.1203)	-0.0083 (0.1190)	0.0064 (0.0989)	0.0081 (0.0989)
Age (years)	0.3022*** (0.0165)	0.3006*** (0.0162)	0.0483*** (0.0087)	0.0440*** (0.0086)	0.3022*** (0.0164)	0.3017*** (0.0162)	0.0462*** (0.0085)	0.0444*** (0.0085)
Age (squared)	-0.0030*** (0.0002)	-0.0029*** (0.0002)	-0.0005*** (0.0001)	-0.0005*** (0.0001)	-0.0030*** (0.0002)	-0.0030*** (0.0002)	-0.0005*** (0.0001)	-0.0005*** (0.0001)
Black	0.7420*** (0.1498)	0.6500*** (0.1491)	0.7050*** (0.1433)	0.7240*** (0.1434)	0.8234*** (0.1684)	0.8345*** (0.1682)	0.7495*** (0.1675)	0.7476*** (0.1675)
Asian	-2.3320*** (0.1804)	-2.1115*** (0.1790)	-1.8815*** (0.1723)	-1.9203*** (0.1719)	-2.1802*** (0.1790)	-2.0638*** (0.1751)	-1.9187*** (0.1733)	-1.9308*** (0.1731)
Other race	0.5044*** (0.1875)	0.5161*** (0.1814)	0.3898** (0.1586)	0.3852** (0.1590)	0.5703*** (0.1769)	0.5821*** (0.1759)	0.4036** (0.1570)	0.4010** (0.1570)
County population in 2006					-0.0000*** (0.0000)	-0.0000* (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
Share of blacks in population, 2004					-0.0143** (0.0060)	-0.0186*** (0.0056)	-0.0030 (0.0039)	-0.0024 (0.0039)
Share of Hispanics in population, 2004					-0.0084 (0.0106)	-0.0054 (0.0084)	-0.0033 (0.0044)	-0.0036 (0.0044)
25 percent or more of residents 25 through 64 years old had neither a high school diploma nor GED in 2000 (1 = yes)					0.3646 (0.2406)	0.3163 (0.2130)	0.1462 (0.1590)	0.1504 (0.1597)
Less than 65 percent of residents 21 through 64 years old were employed in 2000 (1 = yes)					-0.3280 (0.2354)	-0.2474 (0.1974)	-0.0347 (0.1127)	-0.0424 (0.1143)

30 percent or more of households had one or more of these housing conditions in 2000: lacked complete plumbing, lacked complete kitchen, paid 30 percent or more of income for owner costs or rent, or had more than 1 person per room. (1 = yes)					-0.1309	0.0678	0.0738*	0.0514
					(0.0880)	(0.0737)	(0.0381)	(0.0365)
Share of population below poverty line, 2004					0.0122	-0.0276**	-0.0187**	-0.0142**
					(0.0141)	(0.0123)	(0.0076)	(0.0070)
Number of residents declined both between the 1980 and 1990 censuses and between the 1990 and 2000 censuses. (1 = yes)					0.1526	-0.0766	-0.1186	-0.0930
					(0.1516)	(0.1579)	(0.0750)	(0.0719)
Fast food restaurants (NAICS Industry Code 72221) per 100,000 population in 2005					-0.0056***	-0.0010	0.0027**	0.0022*
					(0.0020)	(0.0018)	(0.0013)	(0.0012)
Fitness centers/recreation sports centers (NAICS Industry Code 713940) per 100,000 population in 2005.					-0.0385***	-0.0117	-0.0043	-0.0073
					(0.0083)	(0.0077)	(0.0051)	(0.0053)
Liquor stores (NAICS Industry Code 445310) per 100,000 population in 2005.					0.0053	0.0048	0.0035	0.0036
					(0.0050)	(0.0043)	(0.0024)	(0.0023)
Constant	20.3911***	4.5772***	0.4934	3.5028***	21.3752***	3.6502**	0.2748	2.2494***
	(0.3980)	(1.2679)	(0.3467)	(0.7048)	(0.4520)	(1.4629)	(0.3772)	(0.8374)
Observation	93,302	93,302	93,302	93,302	93,302	93,302	93,302	93,302
R ²	0.0712	0.0793	0.1835	0.1838	0.0751	0.0808	0.1839	0.1840

Coefficients, standard errors adjusted for clustering on the county level in parentheses. All estimates are weighted using the provided weights. */**/** denote statistical significance on the 10%, 5% and 1% level.

Table A2: BMI estimates, OLS, female sample

	No regional controls				Regional controls			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Average county BMI		0.7863*** (0.0374)		-0.2694*** (0.0315)		0.9217*** (0.0465)		-0.1078** (0.0426)
Average cell BMI			0.8213*** (0.0159)	0.8764*** (0.0150)			0.8764*** (0.0142)	0.8905*** (0.0132)
High school dropout	0.5866*** (0.1464)	0.5800*** (0.1494)	0.5138*** (0.1400)	0.5112*** (0.1380)	0.5783*** (0.1493)	0.5880*** (0.1501)	0.5400*** (0.1387)	0.5382*** (0.1384)
Some college	-0.1483* (0.0886)	-0.0862 (0.0871)	-0.0496 (0.0837)	-0.0643 (0.0840)	-0.1174 (0.0874)	-0.0862 (0.0866)	-0.0533 (0.0837)	-0.0559 (0.0837)
College graduate	-1.5060*** (0.0875)	-1.3333*** (0.0876)	-1.2000*** (0.0865)	-1.2386*** (0.0871)	-1.4101*** (0.0878)	-1.3198*** (0.0895)	-1.1970*** (0.0897)	-1.2042*** (0.0895)
Married	-0.3043*** (0.1102)	-0.3786*** (0.1070)	-0.3583*** (0.1003)	-0.3365*** (0.1012)	-0.3789*** (0.1116)	-0.3887*** (0.1091)	-0.3694*** (0.1041)	-0.3681*** (0.1042)
Cohabiting	-0.0180 (0.2024)	0.0470 (0.2019)	0.0279 (0.1881)	0.0087 (0.1875)	0.0103 (0.2018)	0.0214 (0.2007)	-0.0140 (0.1873)	-0.0157 (0.1872)
Divorced	-0.7062*** (0.1430)	-0.7196*** (0.1424)	-0.7216*** (0.1391)	-0.7180*** (0.1389)	-0.7404*** (0.1447)	-0.7313*** (0.1430)	-0.7371*** (0.1394)	-0.7381*** (0.1395)
Widowed	-0.4996*** (0.1483)	-0.5444*** (0.1456)	-0.4149*** (0.1402)	-0.3938*** (0.1406)	-0.5384*** (0.1478)	-0.5472*** (0.1455)	-0.4114*** (0.1407)	-0.4084*** (0.1409)
Separated	-0.4581** (0.2241)	-0.4597** (0.2224)	-0.5184** (0.2130)	-0.5219** (0.2125)	-0.4802** (0.2233)	-0.4551** (0.2225)	-0.5109** (0.2104)	-0.5144** (0.2103)
One child	0.0918 (0.1014)	0.0854 (0.1000)	0.0772 (0.1028)	0.0784 (0.1033)	0.0923 (0.1003)	0.0857 (0.0987)	0.0741 (0.1012)	0.0746 (0.1013)
Two children	-0.0880 (0.1201)	-0.0866 (0.1189)	0.0235 (0.1150)	0.0305 (0.1151)	-0.0828 (0.1208)	-0.0984 (0.1201)	0.0036 (0.1161)	0.0068 (0.1162)
Three or more children	0.1648 (0.1283)	0.1436 (0.1253)	0.2017* (0.1192)	0.2115* (0.1196)	0.1596 (0.1270)	0.1272 (0.1255)	0.1816 (0.1207)	0.1857 (0.1207)
Annual household income <10,000 \$	1.0625*** (0.2178)	0.9635*** (0.1957)	1.0107*** (0.1781)	1.0412*** (0.1829)	0.9650*** (0.2018)	0.9518*** (0.1952)	1.0489*** (0.1808)	1.0517*** (0.1812)
Annual household income 10,000-15,000 \$	1.6413*** (0.2057)	1.5127*** (0.2031)	1.4594*** (0.1929)	1.4912*** (0.1928)	1.5372*** (0.2038)	1.5002*** (0.2058)	1.4893*** (0.1949)	1.4929*** (0.1948)
Annual household income 15,000-20,000 \$	1.3629*** (0.1400)	1.2371*** (0.1351)	1.1769*** (0.1334)	1.2075*** (0.1341)	1.2491*** (0.1361)	1.2449*** (0.1357)	1.2339*** (0.1328)	1.2341*** (0.1328)
Annual household income 20,000-25,000 \$	1.3076*** (0.1336)	1.1980*** (0.1339)	1.1794*** (0.1325)	1.2083*** (0.1321)	1.2084*** (0.1324)	1.1910*** (0.1329)	1.2105*** (0.1290)	1.2126*** (0.1290)

Annual household income 25,000-35,000 \$	0.9292*** (0.1769)	0.8367*** (0.1744)	0.7920*** (0.1732)	0.8145*** (0.1738)	0.8478*** (0.1736)	0.8424*** (0.1743)	0.8268*** (0.1730)	0.8271*** (0.1729)
Annual household income 50,000-75,000 \$	0.5279*** (0.0998)	0.4630*** (0.0978)	0.4458*** (0.0940)	0.4625*** (0.0941)	0.4838*** (0.0981)	0.4548*** (0.0977)	0.4454*** (0.0934)	0.4482*** (0.0933)
Self-employed	-0.8467*** (0.1167)	-0.7647*** (0.1190)	-0.7273*** (0.1219)	-0.7474*** (0.1213)	-0.8085*** (0.1201)	-0.7636*** (0.1191)	-0.7228*** (0.1200)	-0.7266*** (0.1201)
Not working for more than one year	0.3995 (0.2747)	0.3582 (0.2615)	0.2168 (0.2437)	0.2187 (0.2471)	0.3946 (0.2705)	0.3846 (0.2625)	0.2563 (0.2475)	0.2553 (0.2482)
Not working for less than one year	-0.2483 (0.2263)	-0.2051 (0.2244)	-0.3342* (0.2030)	-0.3548* (0.2026)	-0.2148 (0.2220)	-0.2010 (0.2238)	-0.3370* (0.2021)	-0.3406* (0.2019)
Unable to work	1.9490*** (0.2127)	1.8617*** (0.2106)	1.6677*** (0.2052)	1.6787*** (0.2052)	1.9009*** (0.2128)	1.8598*** (0.2102)	1.6684*** (0.2048)	1.6695*** (0.2051)
Other employment	-0.4933*** (0.0782)	-0.4702*** (0.0775)	-0.4753*** (0.0745)	-0.4820*** (0.0740)	-0.4805*** (0.0781)	-0.4684*** (0.0776)	-0.4692*** (0.0731)	-0.4704*** (0.0730)
Age (years)	0.3473*** (0.0139)	0.3476*** (0.0136)	0.1508*** (0.0121)	0.1375*** (0.0122)	0.3480*** (0.0135)	0.3477*** (0.0136)	0.1380*** (0.0119)	0.1347*** (0.0117)
Age (squared)	-0.0032*** (0.0001)	-0.0032*** (0.0001)	-0.0014*** (0.0001)	-0.0013*** (0.0001)	-0.0032*** (0.0001)	-0.0032*** (0.0001)	-0.0013*** (0.0001)	-0.0013*** (0.0001)
Black	2.5737*** (0.1080)	2.4289*** (0.1132)	2.1228*** (0.1096)	2.1422*** (0.1062)	2.6085*** (0.1257)	2.6345*** (0.1229)	2.4670*** (0.1160)	2.4617*** (0.1156)
Asian	-2.2574*** (0.2367)	-1.9065*** (0.2422)	-1.7848*** (0.2598)	-1.8733*** (0.2613)	-2.0950*** (0.2337)	-1.9285*** (0.2404)	-1.8475*** (0.2578)	-1.8630*** (0.2575)
Other race	0.8679*** (0.1675)	0.9157*** (0.1578)	0.7125*** (0.1585)	0.6857*** (0.1581)	0.8829*** (0.1570)	0.9377*** (0.1547)	0.8042*** (0.1533)	0.7965*** (0.1532)
County population in 2006					-0.0000*** (0.0000)	-0.0000 (0.0000)	-0.0000 (0.0000)	-0.0000 (0.0000)
Share of blacks in population, 2004					-0.0181*** (0.0066)	-0.0251*** (0.0051)	-0.0335*** (0.0045)	-0.0330*** (0.0044)
Share of Hispanics in population, 2004					-0.0036 (0.0100)	0.0005 (0.0062)	-0.0069 (0.0059)	-0.0074 (0.0061)
25 percent or more of residents 25 through 64 years old had neither a high school diploma nor GED in 2000 (1 = yes)					0.1815 (0.2047)	0.0968 (0.1950)	0.2504 (0.2156)	0.2614 (0.2143)
Less than 65 percent of residents 21 through 64 years old were employed in 2000 (1 = yes)					-0.1860 (0.1891)	-0.0655 (0.1217)	-0.0138 (0.0882)	-0.0251 (0.0868)
30 percent or more of households had one or more of these housing conditions in 2000: lacked complete plumbing, lacked complete kitchen, paid 30 percent or more of income for					-0.2019** (0.1891)	0.0777 (0.1217)	0.1315** (0.0882)	0.1041* (0.0868)

owner costs or rent, or had more than 1 person per room. (1 = yes)

Share of population below poverty line, 2004					(0.0852)	(0.0662)	(0.0527)	(0.0547)
					0.0398***	-0.0166	-0.0518***	-0.0467***
					(0.0151)	(0.0122)	(0.0127)	(0.0119)
Number of residents declined both between the 1980 and 1990 censuses and between the 1990 and 2000 censuses. (1 = yes)					0.1750	-0.1853	-0.1339	-0.0967
					(0.1593)	(0.1154)	(0.1154)	(0.1173)
Fast food restaurants (NAICS Industry Code 72221) per 100,000 population in 2005					0.0002	0.0066***	0.0044***	0.0037**
					(0.0021)	(0.0017)	(0.0017)	(0.0016)
Fitness centers/recreation sports centers (NAICS Industry Code 713940) per 100,000 population in 2005.					-0.0515***	-0.0122	-0.0039	-0.0077
					(0.0094)	(0.0082)	(0.0073)	(0.0075)
Liquor stores (NAICS Industry Code 445310) per 100,000 population in 2005.					0.0008	0.0010	-0.0013	-0.0014
					(0.0047)	(0.0037)	(0.0032)	(0.0032)
Constant	18.5254***	-2.9924***	1.2435***	7.4576***	18.9193***	-6.8074***	0.5497	3.2648***
	(0.3452)	(1.0461)	(0.3453)	(0.8686)	(0.3780)	(1.3492)	(0.3794)	(1.2263)
Observation	138,138	138,138	138,138	138,138	138,138	138,138	138,138	138,138
R ²	0.0985	0.1085	0.1627	0.1636	0.1016	0.1096	0.1657	0.1658

Coefficients, standard errors adjusted for clustering on the county level in parentheses. All estimates are weighted using the provided weights. */**/** denote statistical significance on the 10%, 5% and 1% level.

Table A3: Own and relative BMI and life satisfaction, ordered probit estimates, male sample

	(1)	(2)	(3)	(4)
BMI	-0.0021 (0.0047)	- (0.0086)	-0.0039 (0.0058)	- (0.0087)
BMI squared	-0.0001* (0.0001)	-0.0001* (0.0001)	-0.0001* (0.0001)	-0.0001* (0.0001)
BMI relative to county average		0.0057*** (0.0019)		0.0060*** (0.0020)
BMI relative to gender-age-county-cell average			0.0004 (0.0008)	-0.0004 (0.0008)
High school dropout	- 0.0463*** (0.0160)	- 0.0462*** (0.0160)	- 0.0463*** (0.0160)	- 0.0462*** (0.0160)
Some college	0.0033 (0.0106)	0.0029 (0.0106)	0.0033 (0.0106)	0.0028 (0.0106)
College graduate	0.1840*** (0.0101)	0.1819*** (0.0101)	0.1839*** (0.0101)	0.1818*** (0.0101)
Married	0.4241*** (0.0145)	0.4248*** (0.0144)	0.4243*** (0.0145)	0.4247*** (0.0144)
Cohabiting	0.1291*** (0.0265)	0.1293*** (0.0264)	0.1292*** (0.0265)	0.1292*** (0.0264)
Divorced	-0.0138 (0.0156)	-0.0134 (0.0156)	-0.0136 (0.0156)	-0.0135 (0.0156)
Widowed	0.0215 (0.0232)	0.0228 (0.0232)	0.0217 (0.0232)	0.0227 (0.0232)
Separated	- 0.1768*** (0.0305)	- 0.1762*** (0.0305)	- 0.1767*** (0.0305)	- 0.1763*** (0.0305)
One child	- 0.0341*** (0.0124)	- 0.0340*** (0.0124)	- 0.0341*** (0.0124)	- 0.0340*** (0.0124)
Two children	-0.0246* (0.0137)	-0.0246* (0.0137)	-0.0246* (0.0137)	-0.0246* (0.0137)
Three or more children	0.0258 (0.0169)	0.0258 (0.0169)	0.0259 (0.0169)	0.0257 (0.0169)
Annual household income <10,000 \$	- 0.5224*** (0.0275)	- 0.5225*** (0.0275)	- 0.5225*** (0.0275)	- 0.5225*** (0.0275)
Annual household income 10,000-15,000 \$	- 0.4975*** (0.0228)	- 0.4981*** (0.0228)	- 0.4976*** (0.0228)	- 0.4980*** (0.0228)
Annual household income 15,000-20,000 \$	- 0.4216*** (0.0183)	- 0.4216*** (0.0183)	- 0.4217*** (0.0183)	- 0.4215*** (0.0183)
Annual household income 20,000-25,000 \$	- 0.3871*** (0.0167)	- 0.3868*** (0.0167)	- 0.3871*** (0.0167)	- 0.3868*** (0.0167)
Annual household income 25,000-35,000 \$	- 0.2957*** (0.0138)	- 0.2954*** (0.0138)	- 0.2957*** (0.0138)	- 0.2954*** (0.0138)
Annual household income 50,000-75,000 \$	- 0.0785*** (0.0107)	- 0.0782*** (0.0107)	- 0.0785*** (0.0107)	- 0.0782*** (0.0107)
Self-employed	0.0965*** (0.0123)	0.0954*** (0.0123)	0.0964*** (0.0123)	0.0955*** (0.0123)
Not working for more than one year	- 0.4995*** (0.0353)	- 0.4997*** (0.0353)	- 0.4995*** (0.0353)	- 0.4997*** (0.0353)

Not working for less than one year	-	-	-	-
	0.4103***	0.4102***	0.4103***	0.4102***
	(0.0271)	(0.0271)	(0.0271)	(0.0271)
Unable to work	-	-	-	-
	0.5622***	0.5613***	0.5622***	0.5613***
	(0.0210)	(0.0210)	(0.0210)	(0.0210)
Other employment	0.1124***	0.1126***	0.1123***	0.1127***
	(0.0138)	(0.0138)	(0.0138)	(0.0138)
Age (years)	-	-	-	-
	0.0152***	0.0152***	0.0148***	0.0155***
	(0.0017)	(0.0017)	(0.0017)	(0.0018)
Age (squared)	0.0002***	0.0002***	0.0002***	0.0002***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Black	0.0782***	0.0785***	0.0781***	0.0786***
	(0.0180)	(0.0180)	(0.0180)	(0.0180)
Asian	-	-	-	-
	0.1522***	0.1560***	0.1524***	0.1561***
	(0.0273)	(0.0271)	(0.0273)	(0.0271)
Other race	0.0599***	0.0587***	0.0599***	0.0587***
	(0.0190)	(0.0191)	(0.0190)	(0.0191)
County population in 2006	-	-	-	-
	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Share of blacks in population, 2004	0.0016*	0.0017**	0.0016*	0.0017**
	(0.0008)	(0.0008)	(0.0008)	(0.0008)
Share of Hispanics in population, 2004	0.0000	-0.0003	0.0000	-0.0003
	(0.0012)	(0.0012)	(0.0012)	(0.0012)
25 percent or more of residents 25 through 64 years old had neither a high school diploma nor GED in 2000 (1 = yes)	0.0431*	0.0482**	0.0435*	0.0480**
	(0.0232)	(0.0232)	(0.0232)	(0.0232)
Less than 65 percent of residents 21 through 64 years old were employed in 2000 (1 = yes)	-0.0319	-0.0319	-0.0320	-0.0319
	(0.0245)	(0.0246)	(0.0245)	(0.0246)
30 percent or more of households had one or more of these housing conditions in 2000: lacked complete plumbing, lacked complete kitchen, paid 30 percent or more of income for owner costs or rent, or had more than 1 person per room. (1 = yes)	-0.0242**	-	-0.0246**	-
	(0.0117)	(0.0117)	(0.0117)	(0.0117)
Share of population below poverty line, 2004	0.0059***	0.0071***	0.0059***	0.0072***
	(0.0018)	(0.0018)	(0.0018)	(0.0018)
Number of residents declined both between the 1980 and 1990 censuses and between the 1990 and 2000 censuses. (1 = yes)	-	-	-	-
	0.0540***	0.0492***	0.0538***	0.0492***
	(0.0187)	(0.0186)	(0.0187)	(0.0186)
Fast food restaurants (NAICS Industry Code 72221) per 100,000 population in 2005	-0.0001	-0.0002	-0.0001	-0.0002
	(0.0003)	(0.0003)	(0.0003)	(0.0003)
Fitness centers/recreation sports centers (NAICS Industry Code 713940) per 100,000 population in 2005.	0.0011	0.0005	0.0011	0.0005
	(0.0010)	(0.0010)	(0.0010)	(0.0010)
Liquor stores (NAICS Industry Code 445310) per 100,000 population in 2005.	-0.0014**	-0.0014**	-0.0014**	-0.0014**
	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Cut 1	-	-	-	-
	2.8610***	2.8665***	2.8546***	2.8727***
	(0.0874)	(0.0877)	(0.0876)	(0.0879)
Cut 2	-	-	-	-
	2.0425***	2.0481***	2.0362***	2.0543***
	(0.0865)	(0.0868)	(0.0867)	(0.0871)
Cut 3	-0.1431*	-0.1485*	-0.1367	-0.1546*
	(0.0860)	(0.0864)	(0.0863)	(0.0866)

Observations	93,302
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Coefficients, standard errors adjusted for clustering on the county level in parentheses. All estimates are weighted using the provided weights. */**/** denote statistical significance on the 10%, 5% and 1% level.

Table A4: Own and relative BMI and life satisfaction, ordered probit estimates, female sample

	(1)	(2)	(3)	(4)
BMI	-	-	-	-
	0.0099***	0.0274***	0.0121***	0.0275***
	(0.0026)	(0.0062)	(0.0033)	(0.0062)
BMI squared	-0.0000	-0.0000	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
BMI relative to county average		0.0048***		0.0051***
		(0.0016)		(0.0018)
BMI relative to gender-age-county-cell average			0.0006	-0.0003
			(0.0006)	(0.0006)
High school dropout	-0.0269**	-0.0268**	-0.0270**	-0.0267**
	(0.0130)	(0.0130)	(0.0130)	(0.0130)
Some college	0.0271***	0.0267***	0.0270***	0.0267***
	(0.0088)	(0.0088)	(0.0088)	(0.0088)
College graduate	0.1829***	0.1817***	0.1827***	0.1817***
	(0.0089)	(0.0090)	(0.0090)	(0.0090)
Married	0.3691***	0.3699***	0.3692***	0.3699***
	(0.0120)	(0.0121)	(0.0120)	(0.0121)
Cohabiting	0.1112***	0.1113***	0.1112***	0.1113***
	(0.0218)	(0.0218)	(0.0218)	(0.0218)
Divorced	0.0117	0.0119	0.0118	0.0118
	(0.0129)	(0.0130)	(0.0129)	(0.0129)
Widowed	0.0980***	0.0987***	0.0979***	0.0988***
	(0.0153)	(0.0153)	(0.0153)	(0.0153)
Separated	-	-	-	-
	0.1551***	0.1544***	0.1549***	0.1545***
	(0.0224)	(0.0224)	(0.0224)	(0.0224)
One child	-	-	-	-
	0.0549***	0.0548***	0.0551***	0.0547***
	(0.0095)	(0.0095)	(0.0095)	(0.0095)
Two children	-	-	-	-
	0.0440***	0.0437***	0.0443***	0.0435***
	(0.0106)	(0.0106)	(0.0106)	(0.0106)
Three or more children	-0.0230*	-0.0229*	-0.0232*	-0.0228*
	(0.0136)	(0.0135)	(0.0136)	(0.0136)
Annual household income <10,000 \$	-	-	-	-
	0.4829***	0.4823***	0.4829***	0.4823***
	(0.0160)	(0.0160)	(0.0160)	(0.0160)
Annual household income 10,000-15,000 \$	-	-	-	-
	0.4674***	0.4669***	0.4674***	0.4668***
	(0.0150)	(0.0150)	(0.0150)	(0.0150)
Annual household income 15,000-20,000 \$	-	-	-	-
	0.4171***	0.4165***	0.4170***	0.4165***
	(0.0130)	(0.0130)	(0.0130)	(0.0130)
Annual household income 20,000-25,000 \$	-	-	-	-
	0.3599***	0.3593***	0.3598***	0.3593***
	(0.0125)	(0.0125)	(0.0125)	(0.0125)
Annual household income 25,000-35,000 \$	-	-	-	-
	0.2863***	0.2860***	0.2863***	0.2860***
	(0.0107)	(0.0107)	(0.0107)	(0.0107)
Annual household income 50,000-75,000 \$	-	-	-	-
	0.0745***	0.0743***	0.0745***	0.0743***
	(0.0099)	(0.0099)	(0.0099)	(0.0099)
Self-employed	0.0960***	0.0950***	0.0959***	0.0950***
	(0.0131)	(0.0131)	(0.0131)	(0.0131)
Not working for more than one year	-	-	-	-
	0.4345***	0.4342***	0.4344***	0.4342***
	(0.0245)	(0.0244)	(0.0245)	(0.0244)

Not working for less than one year	-	-	-	-
	0.3748***	0.3747***	0.3747***	0.3748***
	(0.0232)	(0.0232)	(0.0233)	(0.0233)
Unable to work	-	-	-	-
	0.5817***	0.5810***	0.5814***	0.5811***
	(0.0159)	(0.0159)	(0.0159)	(0.0159)
Other employment	0.0849***	0.0848***	0.0848***	0.0848***
	(0.0087)	(0.0087)	(0.0087)	(0.0087)
Age (years)	-	-	-	-
	0.0094***	0.0094***	0.0089***	0.0097***
	(0.0013)	(0.0013)	(0.0014)	(0.0014)
Age (squared)	0.0001***	0.0001***	0.0001***	0.0001***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Black	0.0730***	0.0737***	0.0732***	0.0736***
	(0.0137)	(0.0137)	(0.0137)	(0.0137)
Asian	-	-	-	-
	0.1224***	0.1255***	0.1229***	0.1255***
	(0.0253)	(0.0251)	(0.0253)	(0.0251)
Other race	0.0032	0.0021	0.0031	0.0020
	(0.0154)	(0.0154)	(0.0154)	(0.0154)
County population in 2006	-	-	-	-
	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Share of blacks in population, 2004	0.0013*	0.0014**	0.0013*	0.0014**
	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Share of Hispanics in population, 2004	-0.0006	-0.0009	-0.0006	-0.0009
	(0.0008)	(0.0008)	(0.0008)	(0.0008)
25 percent or more of residents 25 through 64 years old had neither a high school diploma nor GED in 2000 (1 = yes)	0.0416**	0.0454**	0.0419**	0.0456**
	(0.0184)	(0.0184)	(0.0184)	(0.0184)
Less than 65 percent of residents 21 through 64 years old were employed in 2000 (1 = yes)	0.0025	0.0031	0.0024	0.0031
	(0.0239)	(0.0238)	(0.0239)	(0.0238)
30 percent or more of households had one or more of these housing conditions in 2000: lacked complete plumbing, lacked complete kitchen, paid 30 percent or more of income for owner costs or rent, or had more than 1 person per room. (1 = yes)	0.0046	0.0001	0.0041	0.0001
	(0.0093)	(0.0091)	(0.0093)	(0.0091)
Share of population below poverty line, 2004	0.0030**	0.0040***	0.0032**	0.0040***
	(0.0014)	(0.0015)	(0.0014)	(0.0015)
Number of residents declined both between the 1980 and 1990 censuses and between the 1990 and 2000 censuses. (1 = yes)	-	-	-	-
	0.0577***	0.0538***	0.0571***	0.0539***
	(0.0165)	(0.0160)	(0.0165)	(0.0160)
Fast food restaurants (NAICS Industry Code 72221) per 100,000 population in 2005	0.0002	0.0001	0.0002	0.0001
	(0.0002)	(0.0002)	(0.0002)	(0.0002)
Fitness centers/recreation sports centers (NAICS Industry Code 713940) per 100,000 population in 2005.	0.0014*	0.0009	0.0013	0.0009
	(0.0008)	(0.0008)	(0.0008)	(0.0008)
Liquor stores (NAICS Industry Code 445310) per 100,000 population in 2005.	-	-	-	-
	0.0026***	0.0027***	0.0026***	0.0027***
	(0.0006)	(0.0005)	(0.0005)	(0.0005)
Cut 1	-	-	-	-
	2.8530***	2.8575***	2.8398***	2.8648***
	(0.0539)	(0.0539)	(0.0561)	(0.0558)
Cut 2	-	-	-	-
	2.0773***	2.0817***	2.0640***	2.0890***
	(0.0534)	(0.0534)	(0.0557)	(0.0554)
Cut 3	-	-	-	-
	0.2064***	0.2107***	0.1932***	0.2180***
	(0.0529)	(0.0529)	(0.0551)	(0.0549)

Observations

138,138

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