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Spillover Effects of Local Human Capital Stock on Adult Obesity – Evidence from German Neighborhoods

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Rui Dang[1]

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Abstract

This paper is the first to estimate the causal effect of local human capital stock on individual adiposity and adds to the existing literature on estimating human capital externalities at the neighborhood level. We explore the possible causal pathways that college-educated neighbors exert on individual body weight, with the results revealing small yet significant human capital spillover effects. Among all adults, a percentage point increase in the neighborhood college graduates share results in a decrease of individual body mass index by 0.0026 log points, as well as a decrease of the individual likelihood of being overweight by 0.77 percentage points. Among high school graduates and college graduates, a percentage point increase in the neighborhood college graduates share results in a decrease of individual likelihood of being overweight by approximately 0.83 percentage points.

JEL Classification: I00, R23

Keywords: Obesity; local human capital externalities; control function; non-random sorting

October 2015

1 Rui Dang, RGS Econ and RWI. *– This paper draws from a chapter of my PhD thesis. I am extremely grateful for supervision from Thomas K. Bauer and Hendrik Schmitz, and for suggestions and comments from Daniel Avdic, Hanna Frings, Pilar Gacia-Gomez, Colin Green, Adries de Grip, Corinna Hentschker, Per Johansson, Hendrik Jürges, Martin Karlsson, Arndt Reichert and participants at the Singapore Health Economics Association 2014 conference, the 11th International German Socio-Economic Panel User Conference and seminar participants at the RWI-Essen and the University of Duisburg-Essen for valuable comments and discussions. The author acknowledges the host of RWI-Essen and financial support from the Ruhr Graduate School in Economics and the Mercator Stiftung.* *– All correspondence to: Rui Dang, RGS Econ, Hohenzollernstr. 1-3, 45128, Essen, Germany, e-mail: rui.dang@rgs-econ.de*

1 Introduction

The prevalence of overweight and obesity for adults in Germany has been increasingly cited as a major health issue in recent years. Data from the German Federal Statistical Office indicates that the prevalence of being overweight increased from 56% in 1999 to 62 % in 2013 for men, and from 40% to 43% for women (see e.g. Federal Statistical Office of Germany, 2014; Mensink et al., 2013). It is well accepted that obesity is highly correlated with the prevalence of many diseases throughout adulthood, whereby obese persons are substantially more likely to develop health problems such as high blood pressure and Type 2 diabetes. All of these problems place pressure upon the health care system by increasing health care costs for the German society.[1]

Despite the rich literature explaining the contribution of socioeconomic status to obesity (see, e.g. Scharoun-Lee et al., 2011; MacLaren, 2011; Pampel et al., 2012) and the correlation highlighted between neighborhood social environments and individual health (Macintyre et al., 2002), empirical evidence identifying the causal effects of neighborhood social environment on obesity is rather rare. In this paper, we seek to test the hypothesis that living close to highly educated neighbors reduces obesity by peer effects or obesity norms by investigating the causal impact of the neighborhood human capital stock on several measures of obesity for adults in Germany.

There are several potential causal mechanisms by which the neighborhood share of college graduates may have spillover effects on individual health outcomes. First, neighborhoods with a high share of college graduates may form a social norm against obesity, which will affect an individual's tolerance or perceptions of being obese, or change the image of being overweight or obese (see, e.g. Jelalian and Mehlenbeck, 2002; Eisenberg et al., 2005; Etilé, 2007; Fletcher, 2011; Burke and Young, 2011). Second, individuals learn healthy life styles from their highly educated neighbors; for instance, highly educated individuals usually have healthy eating habits and undertake regular physical activities (Cutler and Lleras-Muney, 2006). Third, people living in a neighborhood face the same contextual influences: by society's nature, people tend to be influenced by those around them. In terms of health, this suggests that the life style of one person may be either directly or indirectly influenced by the life style of people in his or her social network, or people who live next to him or her (see, e.g. Cutler and Glaeser, 2005; Trogdon et al., 2008; Auld, 2011).

This paper extends the existing literature on human capital spillover effects at the small geographical area level (i.e. zip code level or neighborhood level).To the best of our knowledge, the paper closest to ours is Ricci and Zachariadis (2013), who focus on the link between national education level and individual longevity. They show that

[1] Official reports on health care expenditure in Germany indicate that hospital expenditure on obesity and other hyperalimentation increased from 779 million Euros to 863 million Euros from 2002 to 2008, and on diabetes from 4,953 to 6,342 million Euros (Federal Statistical Office of Germany, 2010)

national human capital has a positive effect on longevity. A rapidly growing economic literature focus on human capital externalities (see Moretti, 2004a,b, for review). The spillover effects of local human capital stock emerge as an indirect consequence of aggregate education on individual obesity through peer effects, social norms or social networks. Another strand of literature related to our research aims to explore the existence of neighborhood effects. (see e.g., Galster, 2011; Ioannides, 2011, for review) Examining data from the Moving to Opportunity (MTO) program that includes the provision of housing vouchers sponsered by the United States Department of Housing and Urban Development (HUD), Ludwig et al. (2011) found that moving from poor to rich neighborhoods is associated with a reduced prevalence of extreme obesity and diabetes. Examining data from the German national health interview survey, Maier et al. (2014) found that being low-educated and living in German districts with a high level in terms of a deprivation index are both independently and positively associated with self-reported obesity prevalence.

This paper broadens the scope of the existing human capital externalities literature and neighborhood effects literature in three important aspects: First, this paper contributes to our understanding concerning the role of interactions and connections within social networks as determinants of obesity. Whereas previous literature only estimates the effects of aggregate schooling on aggregate earning and the relationship between the individual education level and their partners' obesity level, this paper estimates the external effects of education on individual health outcomes and finds empirical evidence on causal effects of neighborhood human capital stock on individual obesity.

Second, this paper uses a unique German data set that combines individual and household level variables from the German Socio-Economic Panel(GSOEP) with administrative data on neighborhood characteristics, such as social structures and the rental price data in Germany, to identify how the neighborhood share of college graduates affects the obesity of German adults. We observe information on body weight for a representative sample of 6,998 persons in 2008 and 2010 from the German Socio-Economic Panel. In addition, we exploit detailed geographical location information of each household, based upon the zip code area in which they live. Based on this information, we merge administrative data, which contains information on neighborhood characteristics to the GSOEP. The variation of the share of university graduates across each zip code area is relied upon to identify neighborhood human capital spillover effects. Ultimately, we have important information about apartment rental prices between 2007 and 2010, which we also merged to the GSOEP. We estimate a hedonic rental price regression to control for the unobserved neighborhood amenities that affect households' residential location sorting.

Third, this paper applies a combination of control function and the instrumrental variable estimations, whereby we identify the causal link between neighborhood hu-

man capital stock and individual outcomes. To this end, a fundamental issue is the presence of both individual and neighborhood level unobserved heterogeneity, which influence both individual neighborhood sorting and obesity. First, unobserved individual characteristics such as preference and social capital may be correlated with both individuals' body weight and their residential location. It might be plausible that people with poor obesity outcomes move to neighborhoods where fewer people experience poor obese outcomes. Second, neighborhood-specific unobserved characteristics that are correlated with the share of college graduates may also cause biased estimates of neighborhood effects. Given that neighborhoods in different geographic locations widely differ in amenities, those in which the amenities correlate to obesity reduction may attract more residents who are less obese.

We use a control function strategy to correct for the bias due to residential location sorting. We consider a two-part procedure that takes residential sorting bias into account when we estimate the impact of variation in the neighborhood share of college graduates on individual adiposity, i.e. body mass index (BMI), the probability of being overweight and the probability of being obese. Following Bayer and Ross (2009), our empirical analysis proceeds in two steps. We begin by estimating a hedonic rental price regression. Next, we add the zip code level average residual of the hedonic rental price regression into standard OLS and instrumental variable estimations of the obesity regressions. The average residual per neighborhood serves as an additional control[2] for unobserved neighborhood amenities that affect households' residential location sorting. In addition, we make use of the combination of control function and IV estimation to address non-random selection of households among zip code areas.

The reminder of this paper is organized as follows. In section 2, we present our identification strategy. In section 3, we describe our merged neighborhood data. In section 4, we present empirical results. In section 5, we estimate heteregeneous human capital spillover effects. In section 6, we conclude and discuss policy implications.

2 Identification of human capital spillover effects in the presence of neighborhood sorting

The source of identification in this paper involves the comparison of the BMI for otherwise similar individuals who live in neighborhoods with different college graduate shares in the labor force. The hypothesis tested is that individuals living in a neighborhood with a higher share of college graduates tend to be less obese. The correlation coefficient between the logarithm of BMI and neighborhood share of college graduates is -0.078. The correlation coefficient between individual propensity to be obese

[2] Bayer and Ross (2009) applied this strategy to control for neighborhood unobservable in an individual labor market outcome equation. Petrin and Train (2003) also applied this control function strategy to control for product unobservable in differentiated products research, also finding that the control function approach is easier to implement and applicable in situations for which the fixed effects approach is not

and neighborhood share of college graduates is -0.034, while the correlation coefficient between individual propensity to be overweight and neighborhood share of college graduates is -0.084.[3] However, it is not clear whether the documented association is causal, given that there are many unobserved neighborhood and individual characteristics that both affect obesity and the local stock of human capital.

Our baseline specification for obesity measures is

$$Y_{int} = \alpha + \beta' X_{int} + \gamma' Z_{nt} + UX_{int} + UZ_{nt} + \epsilon_{int} \tag{1}$$

where Y_{int} is one of three types of obesity mesures for adult i who lives in neighborhood n in year t, X_{int} is a vector of individual and household characteristics. UX_{int} represents unobserved individual characteristics that influence obesity; Z_{nt} is a vector of observed neighborhood characteristics;UZ_{nt} is a vector of unobserved neighborhood characteristics.

The vectors Z_{nt} and X_{int} include neighborhood and individual characteristics that could potentially affect obesity outcomes. Specifically, Z_{nt} is a vector of neighborhood social structure and demographic information, including the percentage of college graduates, fraction of social benefit recipients, fraction of foreigners and the population size for neighborhood n in year t. X_{int} is a vector of individual and household characteristics, including socioeconomic characteristics such as age, gender, marital status, immigration status, employment status, number of household members, annual household income after tax.

The first source of unobserved heterogeneity relates to individual unobserved characteristics, by which the identification of the effects of neighborhood education is plagued. Individuals who were prone to be obese may sort themselves into the types of neighborhoods that positively affected health behaviors due to unobserved factors that affect location choice, such as preferences for neighborhood quality. The second source of unobserved heterogeneity relates to neighborhood unobserved heterogeneity, which means that the unobserved neighborhood physical and social environment may also affect individual body weight outcomes.

In order to identify neighborhood education externalities under the existence of complex correlation patterns between the observed and unobserved individual and neighborhood characteristics of equation (1), we will estimate a control function and use information contained in the neighborhood apartment rental prices. Moreover, we make two additional assumptions, namely (1) $E(UX_i|X_i) = 0$ and (2) $E(UZ_i|Z_i) = 0$. The first assumption requires that the covariance between observed and unobserved individual attributes is zero in the population.[4] Assumption (2) requires that neigh-

[3] All three correlation coefficients are statistically significant at 1% level.

[4] Bayer and Ross (2009) pointed out that the identification of neighborhood effects does not rely on this assumption to obtain consistent estimates. However, assumption (1) is crucial for us to justify the identification assumption that our constructed instruments of the predicted neighborhood attributes are

borhood attributes are not correlated to aggregations of the individual attributes of individuals sorting into a neighborhood, so that sorting based on individual observables over group unobservables is exogenous. In this paper, the only source of correlation between neighborhood observables and unobservables is the aggregation of individual attributes sorting into a neighborhood. Under assumption (2), our instrumental variable estimates of neighborhood human capital stock on individual outcomes will not be biased by individual sorting into a neighborhood.

Bayer and Ross (2009) utilized structural features of the sorting mechanisms to reduce the vertical sorting model[5] into a standard selection problem. Their model identifies the effects of individual and group attributes on individual outcomes, allowing for both individual and group unobservable. In order to control for residential sorting due to unobserved neighborhood attributes, in the first step a hedonic housing price function controlling for each dwelling and observed neighborhood attributes is estimated, whereby neighborhood housing prices are treated as a proxy for neighborhood quality; in the second step, the mean residual over each region(U.S. census tract) is calculated and included in the main outcome equation as an additional control for neighborhood unobservable.

To construct an empirical control function for the unobserved neighborhood equality that determine residential location sorting, we estimate a hedonic rental price equation for all observed apartment rental prices.

$$\log(RentalPrice_{mnt}) = \xi + \rho^{'} H_{mnt} + \psi^{'} Z_{nt} + \zeta_{mnt} \tag{2}$$

where $\log(RentalPrice_{mnt})$ is the logarithm of monthly rent of apartment unit m in neighborhood n in year t. H_{mnt} are physical attributes of each unit, including the logarithm of size, house type, house status and age of the unit. Z_{mnt} are neighborhood attributes as shown in equation (1). Any aspects of rental prices explained by the apartment attributes are absorbed by controlling for apartment characteristics.

Our control function approach involves two steps: first, we estimate the hedonic rental price regression (2) to gauge the residual and calculate the average of residual across each zip code area. The control function approach assumes that neighborhood apartment rental prices are monotonic transformations of residing in a neighborhood and the neighborhood quality in the sorting equilibrium, based upon which we are able to show that a flexible function of neighborhood rental prices serves as a suitable

not correlated with the individual unobservables.

[5]Bayer and Ross (2009) carried out a modification of the vertical jurisdictional sorting model (see Epple and Platt, 1998; Epple et al., 2001), which contain two sources of unobserved heterogeneity that influence sorting. In this context, a sorting equilibrium as any variable that is uncorrelated with the individual unobservable will only be correlated withneighborhood choice by affecting sorting over both observed and unobserved location attributes, and likewise, any variable that is uncorrelated with the neighborhood unobservable can only be correlated with neighborhood observables if it is correlated with individual unobservables that influence sorting.

control function for the unobserved neighborhood amenities in the obesity outcomes regression. In particular, it is plausible that the residual of the hedonic control function serves as a good proxy of unobserved neighborhood amenities affecting households' neighborhood sorting in our individual obesity regressions.

We subsequently calculate the block group mean of the residual obtained from a linear hedonic rental price regression (2) of apartment rental offerings between 2007 and 2010[6] and merge the mean residual of the linear hedonic price function with the existing SOEP longitudinal data and neighborhood labor market statistics at the post-code level for 2008 and 2010. We include the neighborhood mean residual in our main obesity regression to capture the unobserved neighborhood attributes that affect individual sorting into neighborhoods in which they are currently living, i.e. we estimate

$$Y_{int} = \alpha + \beta^{'} X_{int} + \theta^{'} PE_{nt} + \eta^{'} NB_{nt} + \overline{\lambda_{nt}} + \epsilon_{int} \tag{3}$$

where PE_{nt} is the neighborhood share of college graduates for neighborhood n in year t. NB_{nt} is a vector of other observed neighborhood social structure and demographic information for neighborhood n in year t. [7]

In the next step, we construct instruments for endogenous neighborhood attributes[8] and our proxy for neighborhood unobservable $\overline{\lambda_{nt}}$. Instruments are required here to address the potential correlation of the observed neighborhood attributes and the remaining component of individual unobservables. We organize individuals into homogenous cells based upon all individual and household observed attributes that are included as explanatory variables in our obesity equation (3),[9] and calculate the cell-based means of the variables for neighborhood attributes as instruments. These instruments are constructed under the assumption that similar households will make the same location choice if they face the same residential location choice set.[10] The key identification assumption is that after conditioning on observed individual and neighborhood attributes and the propensity of selecting one particular neighborhood given the neighborhood quality reflected by the rental price, there is no correlation between unobserved individual attributes across neighborhoods. In fact, the constructed in-

[6] We average the residual of OLS estimates of equation (2) over zip code areas each year and define that $\overline{\lambda_{nt}} = \frac{1}{m} \times \sum_{i=1}^{m} \zeta_{int}$, which is a proxy for neighborhood unobservable, thereby capturing the unobserved neighborhood characteristics that determine individuals' sorting into their neighborhoods of residence.

[7] The vector Z_{nt} in equation (1) and (2) is composed of PE_{nt} and NB_{nt}. In equation (3), Z_{nt} is written into two seperate vectors because the neighborhood share of college graduates is the variable of interest in our regression model (3)

[8] In our body mass index (BMI) regression, neighborhood attributes include: 1) the fraction of higher educated residents; 2) the fraction of social benefit recipients; 3) the population size; and 4) the fraction of foreigners.

[9] We group individuals based upon their age, education, household annual income, number of children in the household, migration status, marital status, eating habit and alcoholic drinking frequency into 30 different cells

[10] Similarly constructed instruments are also applied in Bayer and Ross (2009); Bauer et al. (2011); Bayer et al. (2008); Ioannides and Zabel (2008); French (2005)

struments are correlated with observed neighborhood attributes endogenously determined by the sorting process, yet exogenous to individual unobservables, thus breaking the link between neighborhood variables and the individual unobservables. These instruments are predictive location choice. By assuming that $E(UX_i|X_i) = 0$ in our empirical setting, the mean neighborhood variables of entirely constructed cells based upon individual observables that have already been included in the obesity equation are thus independent of individual unobservables.[11]

3 Data and summary statistics

In this section, we describe the empirical measures of individual obesity and neighborhood human capital stock. The data used for our identification of education externalities is a longitudinal data set constructed through merging three data sources at the zip code level. The observations for German adults come from the restricted use version of German Socio-Economic Panel (GSEOP) with the zip code of households residence [12]. In the GSOEP, Obesity is measured by body mass index (BMI, calculated as weight in kilograms divided by height in meters squared[13]). We define two other indicators of obesity based upon body weight: a dummy variable of being overweight (=1 if BMI $\geq$ 25) and a variable of being obese (=1 if BMI $\geq$ 30). We extract variables of age, gender, marital status, migration background and education level.[14], household income after taxation, and number of household members.[15] We use the zip code area as a neighborhood. The neighborhood social structure data comes from a confidential version of geocoded national administrative employment registers in Germany[16], owned and managed by the German Federal Employment Agency and the Research Institute of German Federal Employment Agency (IAB). The labor market and demographic

[11] In principle, one might imagine that individuals in the same cell are similar on unobserved features, such as ability or tastes, so that the cell members location choices are driven by unobservables that are similar to the unobservables that drive the individualŠs location choice. This possibility is ruled out, however, by the assumption in equation 2 that individual observables are uncorrelated with individual unobservables.

[12] The SOPE part of the data used in this paper were extracted using the Add-On package PanelWhiz for Stata, written by Dr. John P. Haisken-DeNew (john@panelwhiz.eu). The PanelWhiz generated the do file to retrieve the SOEP data used here. Any data or computational errors in this paper are my own. Haisken-Denew and Hahn (2010) describe PanelWhiz in detail, and Peter and Lakes (2009) introduced the geographically referenced information of the German Socio-Economic Panel.

[13] Self-reported body weight and body height have been asked in the SOEP questionnaire every two years since 2002.

[14] We use the UNESCO ISECD classification (the International Standard Classification of Education) to measure the education level. Please find the ISCED criterion at http://www.unesco.org/education/information/nfsunesco/doc/isced_1997.htm We define binary indicators for high school graduates (ISCED 3 and 4) and university graduates (ISCED 5 and 6) and treat the group of primary and lower secondary school graduates (ISCED 1 - 2) as the reference group.

[15] Wagner et al. (2007) provide a comprehensive description of the German Socio-Economic Panel Study (SOEP).

[16] Please see (Scholz et al., 2012) for detailed information concerning the geocoded administrative data at the Institute of Employment Research (IAB). The German administrative employment database is called Integrated Employment Biographies (IEB), which contains all individuals who have been subject to German social insurance.

statistics for zip code areas in Germany are sampled at June 30 of 2008 and 2010. We construct variables indicating the social structure at the zip code level, including the share of college graduates, foreigners and welfare recipients, as well as the population size. The real estate market data in Germany is provided by the *Immobilienscout24*, which is the largest online real estate selling and renting platform in Germany. We estimate the hedonic rental price regression for all apartment rental offers during 2007-2010, whereby the logarithm of rental price is regressed on controls for each dwelling and neighborhood attributes.

In our empirical analysis, we first merge each rental offer in our apartment rental price data with the neighborhood social structures at the post code level and estimate a hedonic rental price regression. Second, we merge the zip code mean residual of the hedonic rental price regression with the individual data and the neighborhood data at the post code level.

Each household and its members reside in a housing unit, and the location of that unit is geocoded to one of approximately 4,500 post code areas. Because of the data security regulations of the German Federal Employment Agency, only social structure and demographic information in zip code areas in which there are more than five college graduates and five social benefit recipients are made available. This restriction, together with excluding persons whose post code level geographically referenced information is missing in either 2008 or 2010 and persons with missing values for body mass index or the used control variables, reduces our sample to 13,911 person-year observations for 2008 and 2010. Table I reports descriptive statistics of all individuals in our data sets and groups of subsamples according to education level, 4,050 person-year observations relate to university graduates, 7,196 to high school graduates and 2,665 to the group of lower educated people. In our full sample, the average BMI is 26.35, the average individual propensity of being obese and overweight is 19 % and 55 %. Table I shows that college gradutes are on average less obese than high school graduates and the low educated group. For college graduates, the average BMI is 26.02, the average individual propensity of being obese and overweight is 17 % and 54 %,respectively. For high school graduates, the average BMI is 26.48, the average individual propensity of being obese and overweight is 20 % and 56 %, respectively. In the lower educated group, the average BMI is 26.38, the average individual propensity of being obese and overweight is 20 % and 55 %,respectively.

After merging the neighborhood social structural data with the longitudinal data extracted from the German Socio-Economic panel, our data set only includes 704 zip code areas in 2008 and 675 zip code areas in 2010. Table II shows summary statistics of 1,379 neighborhoods in our data set. The smallest zip code area has a population of 2,180 adults, whereas the largest zip code area has a population of 25,430 adults. Table III reports summary statistics for individuals within three heterogeneous categories of the neighborhood educational composition typologies (whereby the neighborhood

share of college graduates is less than 5%, between 5% and 15% and greater than 15%, respectively).

As can be seen in Table II, human capital is not equally distributed across Germany in our data. For 2008 and 2010, the neighborhood share of college graduates ranges from 1.42% to 29.75%, while the neighborhood share of social benefit recipients ranges from 0.1% to 10.77%. Around 5% of neighborhoods have an unemployment rate higher than 20 %, whereas only 6% of postcode areas have an unemployment rate lower than or equal to 5.5%.

4 Empirical results

The top panel in Table IV reports estimates of Eq. (1) and (3) when the outcome variable is the logarithm of BMI. Panel B in Table IV reports estimates obtained when the outcome variable is the dummy for being obese, while panel C reports for the dummy for being overweight. Standard errors in all specifications are clustered at the zip code level. The year dummy is added in all regressions of this paper to control for the time trend of BMI.

The first and second columns in panel A of Table IV report our baseline empirical estimates of the effect of neighborhood human capital stock on individual BMI. The first column reports estimates obtained only conditional on neighborhood social structure and population size, highlighting a negative association between the neighborhood share of college graduates and individual body weight. The estimates in column 2 are conditional on individual socioeconomic status, smoking and eating behavior, as well as neighborhood observable. Including the individual socioeconomic status and health behavior slightly reduces the estimated coefficients. In column 1 of panel A, the estimate of the spillover effects of neighborhood education suggests that a one percentage point increase in the share of college-educated workers in a neighborhood is associated with a 0.0038 log points decrease in BMI, which approximately equals to -0.38% of average BMI; while column 2 reports a 0.0022 log points decrease in BMI, which approximately equals to -0.22% of average BMI. However, the coefficients concerning the neighborhood share of college graduates should not be interpreted as causal effects, because they are likely to be biased due to unobserved heterogeneity and selective regional sorting at both the individual and postcode level. Compared to column 1, including the individual socioeconomic status and health behavior further reduces the estimated coefficients.

Column 1 of panel B reports that a one percentage point increase in the neighborhood share of college graduates is associated with a decrease of 0.48 percentage points in individual probability of being obese, i.e. -2.53% relative to the mean individual probabitiy of being obese. Column (2) reports that a one percentage point increase in the neighborhood share of college graduates is associated with a 0.20% decrease in being obese, i.e. -1.21% relative to the mean individual probabitiy of being obese. Col-

umn 1 of panel C reports that a one percentage point increase in the neighborhood share of college graduates is associated with a 1.05 % in terms of being overweight, i.e. -1.91% relative to the mean individual probabitiy of being overweight. Column (2) reports that a one percentage point increase in the neighborhood share of college graduates is associated with a 0.67 percentage points decrease of being overweight, i.e. -1.22% relative to the mean individual probabitiy of being obese. Compared to column 1 in panel B and panel C, including the individual socioeconomic status and health behavior further reduces the estimated coefficients.

We also briefly discuss the coefficients on the other neighborhood covariates for the model of column 2. The neighborhood share of social benefits recipients' population size does not affect our obesity outcomes, as the coefficients are not statistically different from 0. The neighborhood population size is negatively correlated with the individual likelihood of being obese. Moreover, the neighborhood share of foreigners is negatively correlated with all three obesity outcomes.

In column 3 of Table IV, we report OLS estimates of our control function approach constructed in equation (3). By including the estimated residual of the hedonic rental price regression (2),[17] we control for unobserved heterogeneity across zip code areas that may cause bias in the cross-sectional results. The estimated coefficients of the local human capital stock does not change compared to column 2. Moreover, the coefficients on the hedonic residual control are not significantly different from 0, indicating that unobserved neighborhood attributes do not play a role in explaining the relationship between obesity and local human capital.

We now turn to instrumental variable estimates based upon predictive location choice. Some implications of this identification strategy can be justified under assumption (1) in section 2. Our main concern is the potential correlation between unobserved individual factors and individual mobility; for example, this would occur if individuals with better adiposity outcomes move into neighborhoods with higher levels of human capital stock.

We calculate cells-based mean neighborhood attributes for our four neighborhood-level control variables. Similarly, we calculate the cells-based mean of the hedonic residual control to break the link between the unobserved neighborhood attributes and individual observables. As discussed in section 2, the instrumental variables developed neighborhood attributes and hedonic residual are exogenous and not correlated with unobserved individual attributes if the individual observables are orthogonal to individual unobservables, as assumed in assumption (2). Under the additional assumption that similar individuals make similar location choices when facing the same opportunity set, the tendency of individuals with similar observables to move to neighborhoods with same quality implies that the instruments are predictive of location

[17] Table A1 in appendix B shows the hedonic rental price estimation with neighborhood attributes

choice.

In column 4 of Table IV, we report instrumental variable estimates of the control function (3), whereby neighborhood observables and the hedonic residual control are instrumented with the blocked group mean of neighborhood attributes. The estimates on neighborhood variables from the instrumental variable specifications are always statistically significant and larger in magnitude than those arising from OLS. The IV results show that a one percentage point increase in the neighborhood share of college graduates reduces the individual BMI by 0.0026 log points, i.e. -0.26% relative to the average BMI in our sample; the individual likelihood of being obese by 0.33 percentage points and the individual likelihood of being overweight by 0.77 percentage points, i.e. -1.74% and -1.40 % relative to the mean probability of being obese and overweight, resepctively. The estimates on the hedonic control variable in column 4 are larger than 0, yet not statistically significant at 5% level. Table V reports the first stage estimates and the diagnostic tests.[18]

The finding that OLS estimates of neighborhood effects are biased downwards in magnitude implies that individuals with unobservables contributing to poor adiposity outcomes may compensate for these by sorting into locations with better prospects for losing weight, i.e. neighborhoods with fitness centers, organic food markets or a lower density of fast food restaurants. The downward bias in OLS also implies that neighborhood quality is negatively correlated with individual unobserved attributes that contribute to losing weight. Individuals with poor adiposity obesity outcomes may have higher incentives to sort into neighborhood environments with better prospects for losing weight, compared to those with good adiposity outcomes.

For robustness checks, we consider neighborhood education in previous years, and use alternative instrumental variables and alternative physical health measures to estimate human capital spillover effects, in each case basing the estimates upon the same set of individual and neighborhood control variables, as in equation (3).

The lagged neighborhood share of college graduates are assumed to be more exogenous than the neighbohrood human capital stock in the current year, because human capital stock in previous years is not correlated to independent variables during current year. In Table VI, we first estimate whether current changes in obesity outcomes are a function of college graduates share one year earlier (rows 2 in panel A, B and C), two years earlier (rows 3 in panel A, B and C) and three years earlier (rows 4 in panel A, B and C) while controlling for current neighborhood and individual control variables and the hedonic residual control. The estimated IV coefficients of the lagged neighborhood human capital stock on current obesity outcomes are also negative and statistically significant, thus providing further evidence concerning the robustness of

[18] Appendix Tables B2 and B3 in Appendix B.2 report the second stage and first stage regression results with full specifications. Table B2 report the IV estimation of the full regression conditional on year fixed effects

our results. Physical health outcomes are all correlated with obesity outcomes because significantly influences physical health.

To test the validity of our constructed instruments of averages for each homogeneous cell, we subsequently construct median values of neighborhood attributes in each cell without the individual values to instrument for observed neighborhood attributes (row 5 in panel A, B and C in Table VI). The IV coefficients are similar to our basic specifications when we use the means neighborhood attributes as instruments. Accordingly, the instrumental variable estimate results of our model using cells-based means as instruments are robust.

We finally regress three additional physical health outcomes on the same set of individual and neighborhood variables using both ordinary least squares and our instrumental variables specification. These specifications ask whether physical health outcomes are a function of neighborhood human capital stock while controlling for individual and neighborhood observables and the hedonic residual control, as in equation (3) of section 2. We use three variables from the SF-12 questionaire[19] of GSOEP as dependent variables:a summary measure of physical health status (PCS, or physical component summary scale) and two subscale physical health status measures including physical functiong (PF_NBS, physical functioning norm-based scoring) and role physcal (RP_NBS,role physical norm-based scoring). PCS is a weighted combination of the 12 elements and calculated as means of explorative factor analysis and transformed to have mean 50 and standard deviation 10 in the 2004 SOEP sample. PF_NBS and RP_NBS are calculated as a z-transformed scales, with score values 0-100. Higher values of those three variables indicate a better physical health status. If our identification strategy is valid, we would expect neighborhood education to exhibit a positive correlation with physical health status using OLS models due to sorting, and even more positive effects using our IV specification. In panel D of Table VI, we report estimates of spillover effects on the three physical health outcomes that we just described. The estimated OLS coefficients of neighborhood human capital stock are positive for all three physical health outcomes, but only statistically significant for physical component summary scale(PBS). The IV estimates are larger than the OLS estimates in magnitude and statistically significant for physical component summary scale(PBS) and (PF_NBS), indicating that the increased education level of neighborhood peers may promptt slightly higher level of physical health status and physical functioning for adults in Germany, but do not exert spillover effects on individual's role physical status.

[19]Starting from 2002, SOEP adopted the SF-12 questionaire to measure the overall health status of individuals. SF12 contains 12 health-related questions covering the dimensions of both physical and mental health, see Andersen et al. (2007) for a detail description of the SF-12 questionaires and the corresponding second version(SF-12v12), wherein details of the three physical health outcome variables are also documented.

5 Effects Heterogeneity

While the results presented thus far have focused on the effect of neighborhood college share on obesity, the specification adopted is restrictive in that it ignores heterogeneous spillover effects that may occur among different subsamples. In this section, we report estimates for several subsamples based upon individual education level, gender, regions and migration status. For space considerations, I only present estimates of neighborhood college graduates' share. The column (1) in Table VII reports estimates when the outcome variable is the logarithm of BMI, column (2) reports estimates obtained when the outcome variable is the dummy for being obese and column (3) reports estimates when the outcome variable is the dummy for being overweight. The top row of Table VII includes the corresponding IV estimates of the control function (3), obtained using the cells mean of neighborhood attributes for three dependent variables in this paper: BMI, the dummy for being obese and the dummy for being overweight.

We first estimate model (3) separately for each outcome variable in year 2008 and year 2010(rows 2 and 3 of Table VII), respectively. The IV estimates of the spillover effects are negative and statistically significant both in year 2008 and year 2010, and the estimated spillover effects do not have significant difference across years. We subsequently estimate spillover effects for each education group. Rows 4 to 6 in Table VII reports separate IV estimates of the spillover effects of the college graduate share on the three obesity outcomes for three different education groups: less than high school (ISCED 1-2), high school graduates (ISCED 3-4) and college graduates or higher (ISCED 5-6). Row 4 of Table VII reports IV estimates of human capital spillover effects for college graduates, while row 5 reports for high school graduates and row 6 relates to the group of lower educated people. The IV estimations of spillover effects are negative for all three education groups, although very small and close to zero for the low-educated group. For high school graduates, the human capital spillover effect corresponds to -0.0027 log points on BMI (i.e. -0.27% relative to the average BMI), -0.33 percentage points on the individual likelihood of being obese (i.e. -1.74% relative to the mean probability of being obese). Compared to high school graduates, we find that the magnitude of estimated human capital spillover effect for college graduates is larger concerning BMI (-0.0028 log points, i.e. -0.28% relative to the mean logarithm of BMI), while smaller concerning the individual propensity of being obese (-0.31 percentage points, i.e. -1.63 % relative to the mean probability of being obese). Concerning the individual propensity of being overweight, estimated human capital spillover effects are -0.83 percentage points on the individual likelihood of being overweight (i.e. -1.51% relative to the mean probability of being overweight) for both high school graduates and college graduates. These results indicate that the local human capital does not exert effects on the lower educated group, and high school graduates and college graduates may be influenced by their college-educated neighbors.

We then estimate model (3) separately for each outcome variable in the subsamples of women and men (rows 5 and 6 of Table VII), West Germany and East Germany (rows 7 and 8 of Table VII), as well as immigrants and Germans (rows 9 and 10 of Table VII), respectively. The IV estimates of the spillover effects are negative for both women and men, and women are more strongly influenced by their college-educated neighbors compared to men. The results also indicate that individuals living in West Germany are more strongly influenced by their college-educated neighbors compared to East Germany, and Germans are more strongly influenced by their college-educated neighbors compared to immigrants. Finally, rows 13 to 15 in Table VII provides estimates of model (3) for subsamples of individuals living in three categories of neighborhoods by educational composition, measured by the percentage of adults who are university graduates (0-4.9%, 5-10%, 10% or more). The final IV estimates indicate that the local human capital stock has statistically significant negative effects on the individual BMI and the individual propensity of being obese in zip code areas with a share of college graduates more than 5%, while the magnitude of estimated human capital spillover effects is much larger in zip code areas with a share of college graduates between 5% and 10%, comparing to zip code areas with a share larger than 10%.

6 Conclusion and policy implications

In this paper, we estimate the spillover effects of local aggregate education on individual obesity for adults in Germany. We utilize very informative data that merges individual outcomes from the German Socio-Economic Panel with administrative data at the zip code level in Germany. The German Socio-Economic Panel is a comprehensive and representative dataset, while the data concerning neighborhood social structure is provided by the Institute of Employment Research (IAB). Compared to the existing literature addressing the determinants of obesity, this paper's main contribution is the finding of a causal external effect of neighborhood peers' education on obesity. We find that the estimated impact of neighborhood human capital stock is small in magnitude, suggesting that very little of the variance in obesity outcomes is explained by neighborhood tertiary education, although the spillover effects on obesity and body weight are significant for our full sample and more sizable for high school graduates.

Ultimately, the empirical results from the merged neighborhood data concerning the estimated human capital spillover effects are consistent with the hypothesis that living close to highly educated neighbors reduces obesity by peer effects or obesity norms. The human capital spillover effects on obesity are correlated with individual body weight outcomes. I use the residual hedonic rental price regression as an additional control of neighborhood unobservable that affect residential location sorting. Obese individuals sorted into types of neighborhood that positively affected obesity, although we have shown that this sorting effect is fairly small. After control for sorting due to neighborhood unobserved attributes and individual unobserved attributes,

the human capital spillover effects only reduced by less than -0.1% comparing to our OLS estimates on the pooled data. The results suggest that sorting individuals in German neighborhoods does not seem to suggest that individuals who experience poorer obesity outcomes live in neighborhoods with high proportions of people who do not experience poor obese outcomes.

By comparing OLS estimates of the local human capital stock with the final IV estimates, we also find that the sorting bias is small in magnitude and not statistically significant in our obesity regressions. The human capital spillover effects on obesity are heterogeneous for individuals with different levels of education and individuals living in different types of neighborhoods. According to the final IV estimates, the negative spillover effects are greater for high school graduates and college graduates, as well as in neighborhoods with a share of college graduates between 5% and 10%.

The human capital spillover effects on individual obesity in Germany may hold policy relevance. Our empirical results suggest that relocating to neighborhoods with higher share of college graduates may play a small role in fighting against obesity than previously considered. The overall impact of tertiary education on obesity in Germany may be slightly larger, if the presence of human capital externalities in certain residential communities were not ignored by policy makers.

Table I: Summary statistics for SOEP data by education level

	All Individuals	*Primary school Graduates*	*High school Graduates*	*University Graduates*
Outcomes				
Body mass index	26.35(5.05)	26.38(5.37)	26.48(5.05)	26.02(4.74)
Obese (=1 if BMI$\geq$ 30,dummy)	0.19(.39)	0.20(.40)	0.20(.40)	0.17(.37)
Overweight or obese(=1 if $BMI \geq 25$, dummy)	0.55(.50)	0.55(.50)	0.56(.50)	0.54(.50)
Individual and HH characteristics				
Age	50.82(17.94)	49.52(21.88)	51.05(17.37)	51.41(15.21)
Age^2 (1,000)	2.9(1.89)	2.93(2.23)	2.91(1.84)	2.87(1.65)
Migrants(dummy)	0.21(.40)	0.34(.47)	0.18(.38)	0.16(.37)
Women(dummy)	0.52(.50)	0.58(.49)	0.53(.50)	0.46(.50)
Married(dummy)	0.46(.50)	0.56(.50)	0.45(.50)	0.42(.49)
Unemployed(dummy)	0.43(.50)	0.65(.48)	0.41(.49)	0.31(.46)
Household characteristics				
Log (Annual HH income)	10.23(.65)	10.02(.66)	10.19(.61)	10.49(.64)
No. HH Members	2.35(1.18)	2.52(1.35)	2.31(1.13)	2.28(1.14)
# Person-Year Observations	13911	2665	7196	4050

NOTE.—Means and standard deviations are weighted using the SOEP weight. Column (1) reports the means and standard deviations of individual characteristics for the full sample, column (2),(3)and (4) report means and standard deviations for the subsamples of individual with different education level. Table 1 shows that low educated groups and secondary school graduates are more probable to be overweight than university graduates. SOURCE.–SOEP v29, own calculation.

Table II: Summary statistics for neighborhood data

	Mean	Median	10th	25th	75th	90th	Min.	Max.	No. zipcode-years
% College graduates	8.69	7.08	4.03	5.19	10.73	16.07	1.42	29.53	1379
% Benefit Recipient rate	0.99	0.63	0.29	0.40	1.21	2.14	0.11	10.77	1379
% Foreigners	10.64	9.12	2.82	5.35	9.12	14.10	0.63	44.99	1379
Population Size(1,000)	9.38	8.74	5.55	6.95	11.12	14.22	2.18	24.99	1379

SOURCE.–SOEP v29 and the neighborhood data from IAB, own calculations.

Table III: Unweighted Frequencies of Individuals within Categories of Neighborhood-Level Education by Person-Level Education

	0-4.9%	5%-9.9%	10+%	Row total
Lower educated (ISCED 1-2)	690	1454	521	2665
Secondary educated (ISCED 3-4)	1642	4057	1497	7196
Highly educated (ISCED 5-6)	533	2091	1426	4050
Column total	2865	7602	3444	13911

NOTE.— The Table shows the distribution of individual level education within each category of the neighborhood educational composition typologies. The presence of some cells with small sample sizes (e.g., below 500) indicates how difficult it is to disentangle the contextual and individual-level effects of education in a highly segregated neighborhood. SOURCE.–SOEP v29 and the neighborhood data from IAB, own calculations.

Table IV: Neighborhood education and individual obesity

	OLS	OLS	OLS control function	2SLS control function
	(1)	(2)	(3)	(4)
Panel A. Dep. Var. : Log(BMI)				
Neighborhood Attributes:				
Share of college graduates (%)	-0.0038***	-0.0022***	-0.0022***	-0.0026***
	(0.0006)	(0.0005)	(0.0005)	(0.0006)
Share of social benefit recipients(%)	-0.0003	-0.0000	-0.0000	-0.0007
	(0.0022)	(0.0019)	(0.0019)	(0.0019)
Population size (1,000)	-0.0008	-0.0008	-0.0008	-0.0012*
	(0.0006)	(0.0005)	(0.0005)	(0.0006)
Share of foreigners (%)	-0.0006*	-0.0007**	-0.0007**	-0.0010**
	(0.0003)	(0.0003)	(0.0003)	(0.0004)
Hedonic residual control	N/A	N/A	0.0021	-0.0911*
	N/A	N/A	(0.0377)	(0.0553)
R^2	0.0107	0.1236	0.1235	0.1229
Panel B. Dep. Var. : Obese(=1 if bmi $\geq$ 30)				
Neighborhood Attributes:				
Share of college graduates (%)	-0.0048***	-0.0023**	-0.0023**	-0.0033**
	(0.0012)	(0.0012)	(0.0012)	(0.0013)
Share of social benefit recipients(%)	0.0020	0.0020	0.0020	0.0019
	(0.0049)	(0.0046)	(0.0046)	(0.0047)
Population size (1,000)	-0.0024**	-0.0023*	-0.0023*	-0.0026*
	(0.0012)	(0.0012)	(0.0012)	(0.0014)
Share of foreigners (%)	-0.0014**	-0.0015**	-0.0015**	-0.0013
	(0.0007)	(0.0007)	(0.0007)	(0.0009)
Hedonic residual control	N/A	N/A	-0.0524	-0.1705
	N/A	N/A	(0.0943)	(0.1426)
R^2	0.0045	0.0324	0.0323	0.0321
Panel C. Dep. Var. : Overweight(=1 if bmi $\geq$ 25)				
Neighborhood Attributes:				
Share of college graduates (%)	-0.0105***	-0.0067***	-0.0067***	-0.0077***
	(0.0014)	(0.0013)	(0.0013)	(0.0016)
Share of social benefit recipients(%)	-0.0045	-0.0031	-0.0031	-0.0037
	(0.0059)	(0.0051)	(0.0051)	(0.0054)
Population size (1,000)	0.0005	0.0002	0.0002	-0.0006
	(0.0015)	(0.0014)	(0.0014)	(0.0017)
Share of foreigners (%)	-0.0010	-0.0012	-0.0012	-0.0026**
	(0.0008)	(0.0008)	(0.0008)	(0.0010)
Hedonic residual control	N/A	N/A	-0.0278	-0.2647
	N/A	N/A	(0.1281)	(0.1777)
R^2	0.0088	0.1193	0.1192	0.1185
No. Obs.	13911	13911	13911	13911
Specification:	Cross-Sect. Regression	Cross-Sect. Regression	Cross-Sect. Regression	Cross-Sect. Regression
Indivdidual Controls	No	Yes	Yes	Yes
Hedonic Controls	No	No	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Kleibergen-Paap rk LM statistic:	N/A	N/A	N/A	88.828
Kleibergen-Paap rk Wald F statistic:	N/A	N/A	N/A	214.757
Cragg-Donald Wald F statistic :	N/A	N/A	N/A	2508.703
Hansen J statistic:	N/A	N/A	N/A	0

NOTE.—The depedent variable in panel A is the log(Body Mass Index). The dependent variable in panel B is a dummy variable of being obese (=1 if BMI $\geq$ 30). The dependent variable in panel C is a dummy variable of being overweight (=1 if BMI $\geq$ 25). Columns 1-3 report our OLS estimates. In column 1 we report OLS estimates conditional neighborhood social structures and population size, in column 2 we include individual control variables. In column 3 we also include the hedonic residual control. Column 4 reports our IV estimates of the regression model (3) in section (2). Standard errors in parentheses are robust and clustered on zip code level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

Table V: First stage estimates and test statistics

	Share College Graduates(%)	Share Social Benefit Recipients(%)	Share Foreigners (%)	Population size(1,000)	Hedonic Residual
	Ordinary Least Square Estimates				
Instrumental Variables	(1)	(2)	(3)	(4)	(5)
iv_Share of college graduates (%)	0.8090***	0.0056***	0.0119	-0.0012	0.0000
	(0.0128)	(0.0009)	(0.0121)	(0.0063)	(0.0000)
iv_Share of social benefit recipients(%)	-0.1521***	1.0019***	-0.0018	-0.0770	-0.0001
	(0.0346)	(0.0131)	(0.0951)	(0.0522)	(0.0003)
iv_Population size(1,000)	-0.0009	0.0016*	-0.0075	0.7988***	-0.0000
	(0.0064)	(0.0010)	(0.0124)	(0.0148)	(0.0001)
iv_Share of foreigners (%)	0.0016	-0.0002	0.7791***	-0.0017	-0.0000*
	(0.0041)	(0.0007)	(0.0150)	(0.0039)	(0.0000)
iv_Hedonic residual control	0.1064	0.1016	-2.3832*	-0.1062	0.7257***
	(0.7862)	(0.1223)	(1.4159)	(0.8586)	(0.0226)
Exogenous Controls	Yes	Yes	Yes	Yes	Yes
No. Obs.	13911	13911	13911	13911	13911
R^2	0.6490	0.8150	0.5742	0.5952	0.4795
First stage statistics					
F statistics first-stage	933.62	1740.01	611.86	625.71	222.01
Angrist-Pischke first-stage $\chi^2(1)$	4012.33	5785.83	2913.47	2700.70	1037.22
Angrist-Pischke first-stage F statistics	4004.81	5774.98	2908.01	2665.64	1035.27

NOTE.— Standard errors in parentheses are robust and clustered on 1,379 postal area.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.The Angrist-Pischke (AP) first-stage chi-squared and F statistics are tests of underidentification and weak identification, respectively, of individual endogenous regressors.
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

Table VI: Robustness checks

	OLS	2SLS	Sample Size
	(1)	(2)	
	Panel A. Dep. Var. :Log(BMI)		
(1) Basic specification	-0.0022***	-0.0028***	13,911
	(0.0005)	(0.0006)	
(2) Share of neighborhood college graduates $(\%)_{t-1}$	-0.0023***	-0.0027***	13,843
	(0.0005)	(0.0006)	
(3) Share of neighborhood college graduates $(\%)_{t-2}$	-0.0021***	-0.0024***	13,766
	(0.0005)	(0.0006)	
(4) Share of neighborhood college graduates $(\%)_{t-3}$	-0.0021***	-0.0025***	12,959
	(0.0006)	(0.0007)	
(5) Using cells median as instruments	N/A	-0.0026***	13,996
	N/A	(0.0006)	
	Panel B. Dep. Var. :Obese(=1 if bmi $\geq$ 30)		
(1) Basic Specification	-0.0023**	-0.0033**	13,911
	(0.0012)	(0.0013)	
(2) Share of neighborhood college graduates $(\%)_{t-1}$	-0.0025**	-0.0032**	13,843
	(0.0012)	(0.0013)	
(3) Share of neighborhood college graduates $(\%)_{t-2}$	-0.0020*	-0.0026**	13,766
	(0.0012)	(0.0013)	
(4) Share of neighborhood college graduates $(\%)_{t-3}$	-0.0023*	-0.0027*	12,959
	(0.0012)	(0.0014)	
(5) Using cells median as instruments	N/A	-0.0032**	13,911
	N/A	(0.0013)	
	Panel C. Dep. Var. :Overweight or obese(=1 if bmi $\geq$ 25)		
(1) Basic Specification	-0.0067***	-0.0077***	13,911
	(0.0013)	(0.0016)	
(2) Share of neighborhood college graduates $(\%)_{t-1}$	-0.0066***	-0.0073***	13,843
	(0.0013)	(0.0016)	
(3) Share of neighborhood college graduates $(\%)_{t-2}$	-0.0061***	-0.0066***	13,766
	(0.0014)	(0.0016)	
(4) Share of neighborhood college graduates $(\%)_{t-3}$	-0.0064***	-0.0075***	12,959
	(0.0014)	(0.0017)	
(5) Using cells median as instruments	N/A	-0.0078***	13,911
	N/A	(0.0016)	
	Panel D. Spillover effects on three physical health outcomes		
(1) Dep. Var.: Physical component summary scale	0.0552*	0.0876**	13,911
	(0.0314)	(0.0347)	
(2) Dep. Var.: Physical functioning norm-based scoring	0.0279	0.0636**	13,911
	(0.0311)	(0.0349)	
(3) Dep. Var.: Role physical norm-based scoring	0.0416	0.0628	13,911
	(0.0350)	(0.0382)	
Indivdidual Controls	Yes	Yes	
Hedonic control	No	Yes	
Year fixed effects	Yes	Yes	

NOTE.— Each entry in panel A, B, C and D is a seperate regression. Entries in column 1 and 2 are the OLS and IV estimates of coefficients of neighborhood college graduates share (%). The dependent variables are the logathrim of BMI in panel A, individual propensity of being obesity (=1 if BMI) in panel B, individual propensity of being overweight (=1 if BMI $\geq$ 25) in panel C and three physical health outcomes in panel D.
Entries in row (1) of panel A, B and C are the base case from Table IV.
Entries in row (2) of panel A, B and C are the OLS and IV estimation of coefficients for neighborhood share of college graduates one year earlier (%).
Entries in row (3) of panel A, B and C are the OLS and IV estimation of coefficients for neighborhood share of college graduates two year earlier (%).
Entries in row (4) of panel A, B and C are the OLS and IV estimation of coefficients for neighborhood share of college graduates three year earlier (%).
Entries in row (5) of panel A, B and C are OLS and IV estimation of coefficients for neighborhood share of college graduates (%), instruments are constructed based on cells median.
Entries in row (1), (2) and (3) in panel D are the OLS and IV estimates of coefficients of neighbohrood college graduates share (%) when the outcome varialble is Physical component summary scale (row (1)), physical functioning norm-based Scoring (row (2)) and Role physical norm-based scoring (row (3)).
Standard errors in parentheses are robust and clustered on 1,379 postal area.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

Table VII: Effects Heterogeneity

Dep. Var. :	**Log(BMI)**	**Obese (=1 if bmi $\geq$ 30)**	**Overweight (=1 if bmi $\geq$ 25)**	
	2SLS	2SLS	2SLS	Sample Size
	(1)	(2)	(3)	
(1) Basic specification	-0.0026***	-0.0033*	-0.0077***	13,911
	(0.0006)	(0.0013)	(0.0016)	
(2) Subsample:Year 2008	-0.0026***	-0.0037**	-0.0084***	6,913
	(0.0007)	(0.0015)	(0.0019)	
(3) Subsample:Year 2010	-0.0026***	-0.0030**	-0.0072***	6,998
	(0.0006)	(0.0014)	(0.0017)	
(4) Subsample:University graduates	-0.0028***	-0.0031*	-0.0083***	4,050
	(0.0008)	(0.0018)	(0.0024)	
(5) Subsample:High school graduates	-0.0027***	-0.0033*	-0.0083***	7,196
	(0.0009)	(0.0018)	(0.0023)	
(6) Subsample:Lower educated	-0.0018	-0.0042	-0.0049	2,665
	(0.0013)	(0.0029)	(0.0032)	
(7) Subsample:Men	-0.0014*	-0.0020	-0.0060***	6,516
	(0.0007)	(0.0019)	(0.0021)	
(8) Subsample:Women	-0.0037***	-0.0047***	-0.0093***	7,395
	(0.0008)	(0.0015)	(0.0022)	
(9) Subsample:East Germany	-0.0014*	-0.0078	-0.0010	1,896
	(0.0007)	(0.0070)	(0.0093)	
(10) Subsample:West Germany	-0.0023***	-0.0023*	-0.0071***	12,015
	(0.0006)	(0.0014)	(0.0017)	
(11) Subsample:Germans	-0.0030***	-0.0038**	-0.0085***	11,480
	(0.0007)	(0.0013)	(0.0018)	
(12) Subsample:Immigrants	-0.0012	-0.0014	-0.0054*	2,431
	(0.0012)	(0.0029)	(0.0030)	
(13)Subsample:Local college graduates share (%) $\leq$ 5	-0.0169	-0167	-0.0133	2,865
	(0.0200)	(0.0464)	(0.0155)	
(14)Subsample:Local college graduates share (%) 5–10	-0.0073**	-0.0086	-0.0237**	7,602
	(0.0034)	(0.0080)	(0.0094)	
(15)Subsample:Local college graduates share (%) $\geq$ 10	-0.0027*	-0.0018	-0.0095**	3,444
	(0.0014)	(0.0135)	(0.0037)	
Indivdidual Controls	Yes	Yes	Yes	
Hedonic control	Yes	Yes	Yes	
Year fixed effects	Yes	Yes	Yes	

NOTE.— Each entry is a seperate regression on one of the three obesity outcomes for a specific subsample. Entries in column 1 and 2 are the OLS and IV estimates of coefficients of neighborhood college graduates share (%) when the outcome variable is the logarithm of BMI. Entries in column 3 and 4 are the OLS and IV estimates of coefficients of neighborhood college graduates share (%) when the outcome variable is individual propensity of being obese (=1 if BMI $\geq$30). Entries in column 5 and 6 are the OLS and IV estimates of coefficients of neighborhood college graduates share (%) when the outcome variable is individual propensity of being overweight(=1 if BMI $\geq$25). Standard errors in parentheses are robust and clustered on 1,379 postal area.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

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Appendices

Appendix A Hedonic estimation of apartments rental price with neighborhood attributes

Table A1 in appendix A provides the full specification of estimates of the hedonic rental price model (2) described in section 2, controlling for physical attributes of each unit, including the logarithm of size, house type, house status and Age of the unit, as well as neighborhood attributes. Column (1) reports the OLS estimation. Column (2) reports the instrumental variable estiamtion when the cells-based means of neighborhood attributes are used to instruments for the endogeneous observed neighborhood attributes in regression (2). The cells are defined as groups of apartments with similar unit observed characteristics, using the method suggested by (Ekeland et al., 2002) and (Ekeland et al., 2004).

Table A1: Hedonic Rental Price Regression

Dep Var.:	Log(Monthly Apartment Rental Offering Price)	
	OLS	IV
	(1)	(2)
Apartment Characteristics:		
Age	-0.00952***	-0.00895***
	(0.000353)	(0.000481)
Age sq. (1,000)	0.139***	0.135***
	(0.00656)	(0.00950)
Age cub. (1,000)	-0.000578***	-0.000639***
	(0.0000351)	(0.0000488)
log(Size)	0.839***	0.833***
	(0.00609)	(0.00610)
Number of Rooms	0.0127***	0.0182***
	(0.00147)	(0.00219)
Floor	-0.00633***	-0.00231**
	(0.000353)	(0.000912)
Elevator (Dummy)	0.0119***	-0.0229***
	(0.00341)	(0.00537)
Newly Buildt(Dummy)	0.0308***	-0.00105
	(0.00762)	(0.00809)
Cellar (Dummy)	0.00112	0.00165
	(0.00122)	(0.00380)
Balcony (Dummy)	0.0418***	0.0475***

	(0.00172)	(0.00327)
Garden (Dummy)	0.0263***	0.0130***
	(0.00109)	(0.00272)
Kitchen built-in (Dummy)	0.0676***	0.0590***
	(0.00116)	(0.00455)
State: Renovated(Dummy)	-0.0206***	-0.0126*
	(0.00467)	(0.00648)
State: Modernized, well-kept(Dummy)	-0.0543***	-0.0273***
	(0.00430)	(0.00494)
State: Not Renovated or not stated(Dummy)	-0.0844***	-0.0430***
	(0.00491)	(0.00666)
Type: Multi-storey, luxurious(Dummy)	0.0640***	0.0416***
	(0.00457)	(0.00511)
Type: ground floor apartment(Dummy)	-0.00661*	-0.0161***
	(0.00353)	(0.00397)
Type: Attics, Loft(Dummy)	0.0321***	0.0127***
	(0.00320)	(0.00417)
Type: Mezzanine and Basement(Dummy)	-0.000305	-0.0189***
	(0.00385)	(0.00686)
Type: Other(Dummy)	0.00272	-0.0151***
	(0.00356)	(0.00535)
Year 2008(Dummy)	0.00835***	-0.0337***
	(0.00125)	(0.00664)
Year 2009(Dummy)	0.0214***	-0.0140
	(0.00170)	(0.0142)
Year 2010(Dummy)	0.0339***	-0.0234*
	(0.00206)	(0.0140)
Neighborhood attributes:		
% Benefit Recipient rate	0.00153	0.00334
	(0.00116)	(0.0189)
%Unemployment rate	-0.00395***	-0.0238***
	(0.000525)	(0.00252)
%College graduates	0.0153***	0.0347***
	(0.00118)	(0.00215)
%Foreigners	0.00527***	0.0204***
	(0.00107)	(0.00165)
Population Size (1,000)	0.0168***	-0.00237
	(0.00309)	(0.00895)
Constant	2.238***	2.359***
	(0.0363)	(0.139)

Observations	3,291,956	3,291,956
R^2	0.868	0.709

Standard errors in parentheses are robust and clustered on zip code level (1,379 zip code areas).* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. SOURCE.–The neighborhood data from IAB and *Immobilienscout24*, own calculations.

Appendix B Supplementary Tables

B.1 OLS Regression Models

Table B1: OLS Estimates

Dep Var.:	Log(BMI)			Obese			Overweight		
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Neighborhood attributes:									
Share of college graduates (%)	-0.0038***	-0.0022***	-0.0022***	-0.0048***	-0.0023**	-0.0023**	-0.0105***	-0.0067***	-0.0067***
	(0.0006)	(0.0005)	(0.0005)	(0.0012)	(0.0012)	(0.0012)	(0.0014)	(0.0013)	(0.0013)
Share of social benefit recipients(%)	-0.0003	-0.0000	-0.0000	0.0020	0.0020	0.0020	-0.0045	-0.0031	-0.0031
	(0.0022)	(0.0019)	(0.0019)	(0.0049)	(0.0046)	(0.0046)	(0.0059)	(0.0051)	(0.0051)
Population size(1,000)	-0.0008	-0.0008	-0.0008	-0.0024**	-0.0023*	-0.0023*	0.0005	0.0002	0.0002
	(0.0006)	(0.0005)	(0.0005)	(0.0012)	(0.0012)	(0.0012)	(0.0015)	(0.0014)	(0.0014)
Share of foreigners (%)	-0.0006*	-0.0007**	-0.0007**	-0.0014**	-0.0015**	-0.0015**	-0.0010	-0.0012	-0.0012
	(0.0003)	(0.0003)	(0.0003)	(0.0007)	(0.0007)	(0.0007)	(0.0008)	(0.0008)	(0.0008)
Hedonic residual control			0.0021			-0.0524			-0.0278
			(0.0377)			(0.0943)			(0.1281)
Individual and HH attributes:									
Age		0.0113***	0.0113***		0.0155***	0.0155***		0.0261***	0.0261***
		(0.0007)	(0.0007)		(0.0015)	(0.0015)		(0.0020)	(0.0020)
Age^2		-0.0897***	-0.0897***		-0.1318***	-0.1318***		-0.1936***	-0.1936***
		(0.0072)	(0.0072)		(0.0155)	(0.0155)		(0.0194)	(0.0194)
Immigrants (dummy)		0.0087	0.0087		-0.0013	-0.0013		0.0454***	0.0454***
		(0.0056)	(0.0056)		(0.0126)	(0.0126)		(0.0150)	(0.0150)
Female (dummy)		-0.0632***	-0.0632***		-0.0439***	-0.0439***		-0.2016***	-0.2016***
		(0.0038)	(0.0038)		(0.0085)	(0.0085)		(0.0107)	(0.0107)
Married (dummy)		-0.0146***	-0.0146***		-0.0112	-0.0113		-0.0415***	-0.0415***
		(0.0054)	(0.0054)		(0.0117)	(0.0117)		(0.0143)	(0.0143)
High school graduates(dummy)		-0.0166***	-0.0166***		-0.0422***	-0.0422***		-0.0461***	-0.0461***
		(0.0054)	(0.0054)		(0.0123)	(0.0123)		(0.0143)	(0.0143)
College graduates (dummy)		-0.0375***	-0.0375***		-0.0756***	-0.0756***		-0.0858***	-0.0858***
		(0.0064)	(0.0064)		(0.0147)	(0.0147)		(0.0169)	(0.0169)
Not employed (dummy)		0.0037	0.0037		0.0186*	0.0186*		-0.0012	-0.0012
		(0.0049)	(0.0049)		(0.0109)	(0.0109)		(0.0128)	(0.0128)
Log (Annual HH. Income)		-0.0205***	-0.0205***		-0.0421***	-0.0420***		-0.0431***	-0.0431***
		(0.0036)	(0.0036)		(0.0072)	(0.0072)		(0.0099)	(0.0099)
No. HH. Members		0.0032	0.0032		0.0094*	0.0094*		0.0058	0.0057
		(0.0026)	(0.0027)		(0.0054)	(0.0054)		(0.0066)	(0.0067)
Year 2010(dummy)	0.0075***	0.0050***	0.0050***	0.0093***	0.0077**	0.0079**	0.0110**	0.0027	0.0028
	(0.0013)	(0.0012)	(0.0012)	(0.0034)	(0.0034)	(0.0034)	(0.0047)	(0.0046)	(0.0046)
Constant term	3.2891***	3.2238***	3.2238***	0.2508***	0.2992***	0.2990***	0.6345***	0.4410***	0.4409***
	(0.0099)	(0.0401)	(0.0401)	(0.0220)	(0.0790)	(0.0791)	(0.0246)	(0.1125)	(0.1125)
No. Obs.	13911	13911	13911	13911	13911	13911	13911	13911	13911
R^2	0.0107	0.1236	0.1235	0.0045	0.0324	0.0323	0.0088	0.1193	0.1192
Individual Control	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Hedonic Control	No	No	Yes	No	No	Yes	No	No	Yes

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
Year fixed effects are controlled in all OLS estimations. SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

B.2 IV regression models

B.2.1 Second stage estimates

Table B2: IV Estimates

Dep Var.:	ln(BMI)	Obese	Overweight
	(1)	(2)	(3)
Neighborhood attributes:			
Share of college graduates (%)	-0.0026***	-0.0033**	-0.0077***
	(0.0006)	(0.0013)	(0.0016)
Share of social benefit recipients(%)	-0.0007	0.0019	-0.0037
	(0.0019)	(0.0047)	(0.0054)
Population size(1,000)	-0.0012*	-0.0026*	-0.0006
	(0.0006)	(0.0014)	(0.0017)
Share of foreigners (%)	-0.0010**	-0.0013	-0.0026**
	(0.0004)	(0.0009)	(0.0010)
Hedonic residual control	-0.0911*	-0.1705	-0.2647
	(0.0553)	(0.1426)	(0.1777)
Individual and HH. attributes:			
Age	0.0113***	0.0154***	0.0260***
	(0.0007)	(0.0015)	(0.0020)
Age^2	-0.0894***	-0.1312***	-0.1926***
	(0.0072)	(0.0155)	(0.0193)
Immigrants (dummy)	0.0101*	-0.0018	0.0507***
	(0.0056)	(0.0127)	(0.0153)
Female (dummy)	-0.0632***	-0.0438***	-0.2014***
	(0.0038)	(0.0085)	(0.0106)
Married (dummy)	-0.0144***	-0.0112	-0.0405***
	(0.0055)	(0.0117)	(0.0143)
High school graduates(dummy)	-0.0167***	-0.0421***	-0.0469***
	(0.0054)	(0.0122)	(0.0143)
College graduates (dummy)	-0.0371***	-0.0738***	-0.0851***
	(0.0064)	(0.0147)	(0.0170)
Not employed (dummy)	0.0036	0.0186*	-0.0016
	(0.0050)	(0.0109)	(0.0128)
Log (Annual HH. Income)	-0.0198***	-0.0412***	-0.0408***
	(0.0036)	(0.0072)	(0.0099)
No. HH. Members	0.0028	0.0088	0.0045
	(0.0026)	(0.0054)	(0.0067)
Year 2010(dummy)	0.0052***	0.0086**	0.0039
	(0.0013)	(0.0034)	(0.0047)
Constant term	3.2291***	0.3031***	0.4521***
	(0.0404)	(0.0793)	(0.1132)
No. Obs.	13911	13911	13911
R^2	0.1229	0.0321	0.1185
Specification:	Cross-Sect. Regression	Cross-Sect. Regression	Cross-Sect. Regression
%Individual Control	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Kleibergen-Paap rk LM statistic:	88.828	88.828	88.828
Kleibergen-Paap rk Wald F statistic:	214.757	214.757	214.757
Cragg-Donald Wald F statistic :	2508.703	2508.703	2508.703
Hansen J statistic:	0	0	0

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

B.2.2 First stage regressions

Table B3: First stage estimates

Endogenous. Var.:	Share College Graduates(%)	Share Social Benefit Recipients(%)	Share Foreigners (%)	Population size(1,000)	Hedonic Residual
	(1)	(2)	(3)	(4)	(5)
Constructed instruments					
iv_Share of college graduates (%)	0.8090***	0.0056***	0.0119	-0.0012	0.0000
	(0.0128)	(0.0009)	(0.0121)	(0.0063)	(0.0000)
iv_Share of social benefit recipients(%)	-0.1521***	1.0019***	-0.0018	-0.0770	-0.0001
	(0.0346)	(0.0131)	(0.0951)	(0.0522)	(0.0003)
iv_Population size(1,000)	-0.0009	0.0016*	-0.0075	0.7988***	-0.0000
	(0.0064)	(0.0010)	(0.0124)	(0.0148)	(0.0001)
iv_Share of foreigners (%)	0.0016	-0.0002	0.7791***	-0.0017	-0.0000*
	(0.0041)	(0.0007)	(0.0150)	(0.0039)	(0.0000)
iv_Hedonic residual control	0.1064	0.1016	-2.3832*	-0.1062	0.7257***
	(0.7862)	(0.1223)	(1.4159)	(0.8586)	(0.0226)
Exogeneous controls					
Age	-0.0164	0.0008	0.0022	0.0015	0.0000
	(0.0100)	(0.0017)	(0.0197)	(0.0087)	(0.0001)
Age^2	0.1139	-0.0045	-0.0099	-0.0094	-0.0001
	(0.1009)	(0.0175)	(0.2089)	(0.0874)	(0.0005)
Immigrants (dummy)	-0.0259	0.0013	0.8498***	0.0637	0.0000
	(0.0727)	(0.0104)	(0.1487)	(0.0976)	(0.0004)
Female (dummy)	0.0316	-0.0009	0.0092	-0.0087	0.0000
	(0.0439)	(0.0076)	(0.0718)	(0.0411)	(0.0002)
Married (dummy)	0.0519	0.0018	0.1750	-0.0491	-0.0001
	(0.0719)	(0.0128)	(0.1319)	(0.0700)	(0.0004)
High school graduates(dummy)	0.0445	-0.0014	-0.1396	0.0464	-0.0004
	(0.0698)	(0.0127)	(0.1452)	(0.0701)	(0.0004)
College graduates (dummy)	0.3566***	-0.0107	-0.2139	-0.0156	-0.0001
	(0.0872)	(0.0145)	(0.1584)	(0.0796)	(0.0004)
Not employed (dummy)	0.0042	-0.0011	-0.0350	-0.0130	0.0000
	(0.0647)	(0.0113)	(0.1201)	(0.0585)	(0.0004)
Log (Annual HH. Income)	0.1382**	-0.0035	0.1821**	0.0456	0.0002
	(0.0560)	(0.0071)	(0.0915)	(0.0517)	(0.0003)
No. HH. Members	-0.0989***	0.0032	-0.0940*	0.0413	-0.0003**
	(0.0295)	(0.0046)	(0.0547)	(0.0286)	(0.0002)
Year 2010(dummy)	0.0665*	-0.0487***	-0.0601	-0.0746**	0.0013
	(0.0399)	(0.0077)	(0.0604)	(0.0339)	(0.0008)
Constant term	0.8453	-0.0318	0.3508	1.6017***	-0.0015
	(0.6613)	(0.0790)	(1.1177)	(0.5860)	(0.0031)
No. Obs.	13911	13911	13911	13911	13911
R^2	0.6490	0.8151	0.5742	0.5953	0.4797
First stage statistics					
F statistics first-stage	933.62	1740.01	611.86	625.71	222.01
Angrist-Pischke first-stage $\chi^2(1)$	4012.33	5785.83	2913.47	2700.70	1037.22
Angrist-Pischke first-stage F statistics	4004.81	5774.98	2908.01	2665.64	1035.27

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

B.3 Robustness checks

B.3.1 The human capital spillover effects on physical health outcomes

Table B4: Neighborhood education and physical health outcomes

Dep Var.:	Summary Score Physical		Psysical Functioning		Role Physical	
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Neighborhood attributes:						
Share of college graduates (%)	0.0552*	0.0876**	0.0279	0.0636*	0.0416	0.0628
	(0.0314)	(0.0347)	(0.0311)	(0.0349)	(0.0350)	(0.0382)
Share of social benefit recipients(%)	-0.1857	-0.1260	-0.3944***	-0.3398***	-0.1846	-0.1506
	(0.1166)	(0.1214)	(0.1207)	(0.1264)	(0.1335)	(0.1389)
Population size(1,000)	0.0169	0.0485	0.0010	0.0043	0.0306	0.0598
	(0.0372)	(0.0413)	(0.0353)	(0.0391)	(0.0443)	(0.0468)
Share of foreigners (%)	0.0319*	0.0243	0.0270	0.0149	0.0285	0.0169
	(0.0183)	(0.0228)	(0.0196)	(0.0245)	(0.0204)	(0.0250)
Hedonic residual control		5.4158		3.9420		-3.8741
		(4.2637)		(4.4077)		(4.6334)
Individual and HH. attributes:						
Age	-0.2746***	-0.2720***	-0.1672***	-0.1642***	-0.1779***	-0.1767***
	(0.0442)	(0.0442)	(0.0442)	(0.0442)	(0.0483)	(0.0483)
Age^2	-0.0316	-0.0492	-1.0983**	-1.1182**	-0.0700	-0.0775
	(0.4440)	(0.4443)	(0.4418)	(0.4415)	(0.4898)	(0.4896)
Immigrants (dummy)	-0.7060**	-0.6769*	-0.5379	-0.4833	-0.0630	-0.0251
	(0.3495)	(0.3560)	(0.3543)	(0.3578)	(0.3960)	(0.4014)
Female (dummy)	-0.4987**	-0.5027**	-1.1053***	-1.1107***	-1.5443***	-1.5455***
	(0.2111)	(0.2110)	(0.2063)	(0.2063)	(0.2178)	(0.2177)
Married (dummy)	0.3388	0.3446	-0.1155	-0.1147	-0.0274	-0.0192
	(0.3116)	(0.3118)	(0.3173)	(0.3171)	(0.3430)	(0.3435)
High school graduates(dummy)	1.6554***	1.6439***	1.5874***	1.5769***	1.2963***	1.2723***
	(0.3268)	(0.3268)	(0.3247)	(0.3244)	(0.3524)	(0.3528)
College graduates (dummy)	2.9137***	2.8487***	2.5768***	2.4998***	1.8028***	1.7570***
	(0.3851)	(0.3866)	(0.3828)	(0.3853)	(0.4250)	(0.4254)
Not employed (dummy)	-1.8964***	-1.8944***	-1.6511***	-1.6526***	-1.8518***	-1.8535***
	(0.3015)	(0.3017)	(0.3025)	(0.3024)	(0.3221)	(0.3220)
Log (Annual HH. Income)	1.6751***	1.6488***	1.6802***	1.6626***	1.7575***	1.7496***
	(0.2250)	(0.2247)	(0.2299)	(0.2288)	(0.2405)	(0.2401)
No. HH. Members	0.0652	0.0771	0.0328	0.0488	-0.0676	-0.0732
	(0.1470)	(0.1472)	(0.1474)	(0.1476)	(0.1596)	(0.1602)
Constant term	42.9225***	42.5275***	41.9146***	41.7235***	39.4053***	39.0806***
	(2.5030)	(2.4987)	(2.5762)	(2.5797)	(2.7866)	(2.7924)
No. Obs.	13911	13911	13911	13911	13911	13911
R^2	0.2118	0.2113	0.2081	0.2078	0.1115	0.1115

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

B.3.2 The effects of lagged human capital stock on current obesity outcomes

Table B5: Lagged neighborhood education (one year earlier) and current body weight outcomes

Dep. Var.:	Log(BMI)	Log(BMI)	Obese	Obese	Overweight	Overweight
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Neighborhood attributes:						
Share of college graduates$_{t-1}$ (%)	-0.0023***	-0.0027***	-0.0025**	-0.0032**	-0.0066***	-0.0073***
	(0.0005)	(0.0006)	(0.0012)	(0.0013)	(0.0013)	(0.0016)
Share of social benefit recipients(%)	0.0001	-0.0005	0.0022	0.0023	-0.0025	-0.0028
	(0.0019)	(0.0019)	(0.0046)	(0.0048)	(0.0051)	(0.0054)
Population size(1,000)	-0.0008	-0.0012*	-0.0023*	-0.0025*	0.0003	-0.0005
	(0.0005)	(0.0006)	(0.0012)	(0.0014)	(0.0014)	(0.0017)
Share of foreigners (%)	-0.0007**	-0.0010**	-0.0015**	-0.0014	-0.0013	-0.0027***
	(0.0003)	(0.0004)	(0.0007)	(0.0009)	(0.0008)	(0.0010)
Hedonic residual control		-0.0948*		-0.1775		-0.2778
		(0.0558)		(0.1436)		(0.1787)
Individual and HH. attributes:						
Age	0.0114***	0.0113***	0.0155***	0.0155***	0.0264***	0.0263***
	(0.0007)	(0.0007)	(0.0015)	(0.0016)	(0.0020)	(0.0020)
Age^2	-0.0903***	-0.0900***	-0.1320***	-0.1315***	-0.1957***	-0.1951***
	(0.0072)	(0.0072)	(0.0155)	(0.0155)	(0.0195)	(0.0194)
Immigrants (dummy)	0.0089	0.0102*	-0.0009	-0.0012	0.0453***	0.0508***
	(0.0056)	(0.0057)	(0.0126)	(0.0128)	(0.0150)	(0.0153)
Female (dummy)	-0.0631***	-0.0630***	-0.0442***	-0.0441***	-0.2010***	-0.2008***
	(0.0038)	(0.0038)	(0.0085)	(0.0085)	(0.0107)	(0.0107)
Married (dummy)	-0.0144***	-0.0142***	-0.0110	-0.0110	-0.0421***	-0.0411***
	(0.0055)	(0.0055)	(0.0117)	(0.0118)	(0.0144)	(0.0144)
High school graduates(dummy)	-0.0168***	-0.0170***	-0.0420***	-0.0421***	-0.0462***	-0.0471***
	(0.0054)	(0.0054)	(0.0123)	(0.0122)	(0.0143)	(0.0143)
College graduates (dummy)	-0.0376***	-0.0372***	-0.0752***	-0.0738***	-0.0868***	-0.0867***
	(0.0064)	(0.0064)	(0.0147)	(0.0147)	(0.0169)	(0.0170)
Not employed (dummy)	0.0041	0.0039	0.0187*	0.0187*	0.0007	0.0003
	(0.0050)	(0.0050)	(0.0110)	(0.0110)	(0.0129)	(0.0129)
Log (Annual HH. Income)	-0.0202***	-0.0195***	-0.0419***	-0.0412***	-0.0422***	-0.0400***
	(0.0036)	(0.0036)	(0.0072)	(0.0073)	(0.0099)	(0.0099)
No. HH. Members	0.0033	0.0029	0.0096*	0.0091*	0.0061	0.0049
	(0.0027)	(0.0027)	(0.0054)	(0.0054)	(0.0067)	(0.0067)
Year 2010(dummy)	0.0054***	0.0057***	0.0078**	0.0089**	0.0038	0.0051
	(0.0013)	(0.0013)	(0.0034)	(0.0035)	(0.0047)	(0.0047)
Constant term	3.2181***	3.2230***	0.2977***	0.2995***	0.4195***	0.4283***
	(0.0402)	(0.0405)	(0.0794)	(0.0797)	(0.1130)	(0.1137)
No. Obs.	13843	13843	13843	13843	13843	13843
R^2	0.1229	0.1222	0.0321	0.0319	0.1186	0.1179

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

Table B6: Lagged neighborhood education (two years earlier) and current body weight outcomes

Dep. Var.:	Log(BMI)	Log(BMI)	Obese	Obese	Overweight	Overweight
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Neighborhood attributes:						
Share of college graduates$_{t-2}$ (%)	-0.0023***	-0.0026***	-0.0024**	-0.0030**	-0.0064***	-0.0070***
	(0.0006)	(0.0006)	(0.0012)	(0.0013)	(0.0014)	(0.0016)
Share of social benefit recipients(%)	0.0001	-0.0005	0.0024	0.0026	-0.0024	-0.0023
	(0.0019)	(0.0019)	(0.0046)	(0.0048)	(0.0051)	(0.0054)
Population size(1,000)	-0.0008	-0.0012*	-0.0023*	-0.0025*	0.0003	-0.0003
	(0.0005)	(0.0006)	(0.0012)	(0.0015)	(0.0014)	(0.0017)
Share of foreigners (%)	-0.0007**	-0.0011***	-0.0015**	-0.0014	-0.0014*	-0.0028***
	(0.0003)	(0.0004)	(0.0007)	(0.0009)	(0.0008)	(0.0010)
Hedonic residual control		-0.1039*		-0.1825		-0.2918
		(0.0560)		(0.1442)		(0.1787)
Individual and HH. attributes:						
Age	0.0115***	0.0114***	0.0157***	0.0156***	0.0265***	0.0265***
	(0.0007)	(0.0007)	(0.0016)	(0.0016)	(0.0020)	(0.0020)
Age^2	-0.0910***	-0.0908***	-0.1334***	-0.1330***	-0.1971***	-0.1966***
	(0.0072)	(0.0072)	(0.0155)	(0.0155)	(0.0195)	(0.0194)
Immigrants (dummy)	0.0090	0.0104*	-0.0010	-0.0013	0.0450***	0.0507***
	(0.0056)	(0.0057)	(0.0127)	(0.0128)	(0.0151)	(0.0154)
Female (dummy)	-0.0636***	-0.0635***	-0.0455***	-0.0454***	-0.2017***	-0.2016***
	(0.0038)	(0.0038)	(0.0086)	(0.0086)	(0.0107)	(0.0107)
Married (dummy)	-0.0138**	-0.0135**	-0.0088	-0.0089	-0.0406***	-0.0395***
	(0.0055)	(0.0055)	(0.0118)	(0.0119)	(0.0144)	(0.0144)
High school graduates(dummy)	-0.0170***	-0.0172***	-0.0421***	-0.0421***	-0.0464***	-0.0474***
	(0.0054)	(0.0054)	(0.0123)	(0.0123)	(0.0144)	(0.0144)
College graduates (dummy)	-0.0375***	-0.0373***	-0.0751***	-0.0740***	-0.0862***	-0.0865***
	(0.0064)	(0.0065)	(0.0147)	(0.0147)	(0.0170)	(0.0171)
Not employed (dummy)	0.0042	0.0041	0.0188*	0.0188*	0.0004	0.0000
	(0.0050)	(0.0050)	(0.0110)	(0.0110)	(0.0130)	(0.0130)
Log (Annual HH. Income)	-0.0205***	-0.0198***	-0.0423***	-0.0416***	-0.0429***	-0.0408***
	(0.0036)	(0.0036)	(0.0073)	(0.0073)	(0.0100)	(0.0100)
No. HH. Members	0.0036	0.0032	0.0103*	0.0098*	0.0065	0.0054
	(0.0027)	(0.0027)	(0.0055)	(0.0055)	(0.0067)	(0.0067)
Year 2010(dummy)	0.0056***	0.0060***	0.0079**	0.0090**	0.0036	0.0050
	(0.0013)	(0.0013)	(0.0035)	(0.0035)	(0.0047)	(0.0047)
Constant term	3.2170***	3.2214***	0.2927***	0.2940***	0.4189***	0.4257***
	(0.0402)	(0.0405)	(0.0795)	(0.0797)	(0.1135)	(0.1142)
No. Obs.	13766	13766	13766	13766	13766	13766
R^2	0.1232	0.1225	0.0321	0.0319	0.1182	0.1175

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

Table B7: Lagged neighborhood education (three years earlier) and current body weight outcomes

Dep. Var.:	Log(BMI)	Log(BMI)	Obese	Obese	Overweight	Overweight
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Neighborhood attributes:						
Share of college graduates$_{t-3}$ (%)	-0.0023***	-0.0027***	-0.0026**	-0.0031**	-0.0067***	-0.0075***
	(0.0006)	(0.0007)	(0.0012)	(0.0014)	(0.0014)	(0.0018)
Share of social benefit recipients(%)	0.0007	0.0003	0.0027	0.0037	-0.0013	-0.0008
	(0.0019)	(0.0019)	(0.0045)	(0.0048)	(0.0050)	(0.0053)
Population size(1,000)	-0.0007	-0.0011*	-0.0022*	-0.0023	0.0009	0.0002
	(0.0005)	(0.0006)	(0.0012)	(0.0015)	(0.0014)	(0.0017)
Share of foreigners (%)	-0.0007**	-0.0010**	-0.0014**	-0.0014	-0.0012	-0.0026**
	(0.0003)	(0.0004)	(0.0007)	(0.0009)	(0.0008)	(0.0011)
Hedonic residual control		-0.0968*		-0.1920		-0.2696
		(0.0578)		(0.1488)		(0.1843)
Individual and HH. attributes:						
Age	0.0118***	0.0118***	0.0166***	0.0165***	0.0272***	0.0271***
	(0.0007)	(0.0007)	(0.0016)	(0.0016)	(0.0020)	(0.0020)
Age^2	-0.0946***	-0.0943***	-0.1419***	-0.1415***	-0.2029***	-0.2022***
	(0.0073)	(0.0073)	(0.0157)	(0.0157)	(0.0198)	(0.0198)
Immigrants (dummy)	0.0096*	0.0111*	0.0007	0.0008	0.0454***	0.0508***
	(0.0058)	(0.0058)	(0.0128)	(0.0130)	(0.0155)	(0.0158)
Female (dummy)	-0.0641***	-0.0640***	-0.0470***	-0.0469***	-0.2032***	-0.2030***
	(0.0039)	(0.0039)	(0.0088)	(0.0088)	(0.0109)	(0.0109)
Married (dummy)	-0.0129**	-0.0127**	-0.0070	-0.0071	-0.0383**	-0.0374**
	(0.0057)	(0.0057)	(0.0121)	(0.0121)	(0.0149)	(0.0149)
High school graduates(dummy)	-0.0170***	-0.0172***	-0.0402***	-0.0403***	-0.0497***	-0.0505***
	(0.0055)	(0.0055)	(0.0126)	(0.0126)	(0.0147)	(0.0147)
College graduates (dummy)	-0.0376***	-0.0373***	-0.0763***	-0.0755***	-0.0865***	-0.0862***
	(0.0066)	(0.0066)	(0.0151)	(0.0151)	(0.0174)	(0.0175)
Not employed (dummy)	0.0049	0.0047	0.0214*	0.0213*	-0.0011	-0.0016
	(0.0051)	(0.0051)	(0.0113)	(0.0113)	(0.0132)	(0.0132)
Log (Annual HH. Income)	-0.0202***	-0.0195***	-0.0420***	-0.0414***	-0.0434***	-0.0412***
	(0.0037)	(0.0037)	(0.0075)	(0.0075)	(0.0101)	(0.0101)
No. HH. Members	0.0037	0.0034	0.0102*	0.0097*	0.0076	0.0064
	(0.0028)	(0.0028)	(0.0057)	(0.0057)	(0.0068)	(0.0069)
Year 2010(dummy)	0.0048***	0.0052***	0.0057	0.0068*	0.0017	0.0031
	(0.0015)	(0.0015)	(0.0038)	(0.0039)	(0.0051)	(0.0052)
Constant term	3.2031***	3.2076***	0.2713***	0.2707***	0.4013***	0.4080***
	(0.0409)	(0.0412)	(0.0815)	(0.0816)	(0.1156)	(0.1162)
No. Obs.	12959	12959	12959	12959	12959	12959
R^2	0.1231	0.1225	0.0329	0.0327	0.1187	0.1180

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

B.3.3 Robustness checks of validity of IV

Table B8: IV Models: blocked group median as instruments

Dep. Var.:	Log(BMI)	Obese	Overweight
	(1)	(2)	(3)
Neighborhood attributes:			
Share of college graduates (%)	-0.0026***	-0.0032**	-0.0078***
	(0.0006)	(0.0013)	(0.0016)
Share of social benefit recipients(%)	-0.0011	0.0021	-0.0050
	(0.0019)	(0.0047)	(0.0054)
Population size(1,000)	-0.0012*	-0.0026*	-0.0006
	(0.0006)	(0.0014)	(0.0017)
Share of foreigners (%)	-0.0010**	-0.0013	-0.0026**
	(0.0004)	(0.0009)	(0.0010)
Hedonic residual control	-0.0912*	-0.1705	-0.2649
	(0.0553)	(0.1426)	(0.1777)
Individual and HH. attributes:			
Age	0.0113***	0.0154***	0.0260***
	(0.0007)	(0.0015)	(0.0020)
Age^2	-0.0894***	-0.1312***	-0.1927***
	(0.0072)	(0.0155)	(0.0193)
Immigrants (dummy)	0.0100*	-0.0017	0.0505***
	(0.0056)	(0.0127)	(0.0153)
Female(dummy)	-0.0632***	-0.0438***	-0.2014***
	(0.0038)	(0.0085)	(0.0106)
Married(dummy)	-0.0144***	-0.0112	-0.0404***
	(0.0055)	(0.0117)	(0.0143)
High school graduates(dummy)	-0.0167***	-0.0421***	-0.0468***
	(0.0054)	(0.0122)	(0.0143)
College graduates (dummy)	-0.0371***	-0.0738***	-0.0850***
	(0.0064)	(0.0147)	(0.0170)
Not employed (dummy)	0.0036	0.0186*	-0.0016
	(0.0050)	(0.0109)	(0.0128)
Log (Annual HH. Income)	-0.0199***	-0.0412***	-0.0409***
	(0.0036)	(0.0072)	(0.0099)
No. HH. Members	0.0029	0.0088	0.0045
	(0.0026)	(0.0054)	(0.0067)
Year 2010(dummy)	0.0051***	0.0087**	0.0035
	(0.0013)	(0.0034)	(0.0046)
Constant term	3.2301***	0.3026***	0.4550***
	(0.0404)	(0.0793)	(0.1131)
No. Obs.	13911	13911	13911
R^2	0.1229	0.0321	0.1185

Standard errors in parentheses are robust and clustered on 1,379 postal areas.
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. SOURCE.–
SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

B.4 Effects heterogeneity across years

Table B9: Neighborhood education and individual obesity 2008

Dep. Var.:	Log(BMI)	Log(BMI)	Obese	Obese	Overweight	Overweight
	(1) OLS	(2) 2SLS	(3) OLS	(4) 2SLS	(5) OLS	(6) 2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Neighborhood attributes:						
Share of college graduates (%)	-0.0022***	-0.0026***	-0.0029**	-0.0037**	-0.0068***	-0.0084***
	(0.0006)	(0.0007)	(0.0012)	(0.0015)	(0.0015)	(0.0019)
Share of social benefit recipients(%)	0.0006	0.0004	0.0023	0.0048	-0.0022	-0.0043
	(0.0019)	(0.0020)	(0.0046)	(0.0050)	(0.0053)	(0.0059)
Population size(1,000)	-0.0007	-0.0006	-0.0021*	-0.0007	0.0004	0.0008
	(0.0005)	(0.0007)	(0.0012)	(0.0016)	(0.0016)	(0.0020)
Share of foreigners (%)	-0.0008**	-0.0011**	-0.0012*	-0.0015	-0.0016*	-0.0024**
	(0.0003)	(0.0004)	(0.0007)	(0.0010)	(0.0009)	(0.0012)
Hedonic residual control		0.0452		0.1599		-0.0182
		(0.0964)		(0.2356)		(0.2902)
Individual and HH. attributes:						
Age	0.0114***	0.0114***	0.0151***	0.0150***	0.0260***	0.0259***
	(0.0008)	(0.0008)	(0.0017)	(0.0017)	(0.0022)	(0.0022)
Age^2	-0.0903***	-0.0900***	-0.1271***	-0.1263***	-0.1902***	-0.1890***
	(0.0079)	(0.0079)	(0.0178)	(0.0178)	(0.0223)	(0.0223)
Immigrants (dummy)	0.0089	0.0100*	-0.0019	-0.0008	0.0506***	0.0533***
	(0.0057)	(0.0058)	(0.0135)	(0.0137)	(0.0161)	(0.0163)
Female (dummy)	-0.0639***	-0.0639***	-0.0433***	-0.0433***	-0.2022***	-0.2019***
	(0.0039)	(0.0039)	(0.0091)	(0.0091)	(0.0114)	(0.0114)
Married (dummy)	-0.0161***	-0.0157***	-0.0074	-0.0067	-0.0469***	-0.0455***
	(0.0056)	(0.0056)	(0.0128)	(0.0128)	(0.0157)	(0.0157)
High school graduates(dummy)	-0.0164***	-0.0165***	-0.0448***	-0.0451***	-0.0519***	-0.0520***
	(0.0055)	(0.0055)	(0.0132)	(0.0132)	(0.0154)	(0.0154)
College graduates (dummy)	-0.0373***	-0.0370***	-0.0740***	-0.0730***	-0.0945***	-0.0922***
	(0.0065)	(0.0065)	(0.0154)	(0.0154)	(0.0182)	(0.0184)
Not employed (dummy)	0.0058	0.0056	0.0188	0.0186	0.0001	-0.0000
	(0.0054)	(0.0054)	(0.0123)	(0.0123)	(0.0152)	(0.0153)
Log (Annual HH. Income)	-0.0195***	-0.0192***	-0.0388***	-0.0384***	-0.0444***	-0.0426***
	(0.0042)	(0.0042)	(0.0081)	(0.0082)	(0.0112)	(0.0113)
No. HH. Members	0.0032	0.0029	0.0092	0.0085	0.0050	0.0038
	(0.0027)	(0.0027)	(0.0059)	(0.0059)	(0.0070)	(0.0070)
Constant term	3.2077***	3.2103***	0.2743***	0.2661***	0.4595***	0.4672***
	(0.0466)	(0.0473)	(0.0894)	(0.0904)	(0.1299)	(0.1318)
No. Obs.	6913	6913	6913	6913	6913	6913
R^2	0.1348	0.1346	0.0310	0.0307	0.1268	0.1262

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

Table B10: Neighborhood education and individual obesity 2010

Dep. Var.:	Log(BMI) (1) OLS	Log(BMI) (2) 2SLS	Obese (3) OLS	Obese (4) 2SLS	Overweight (5) OLS	Overweight (6) 2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Neighborhood attributes:						
Share of college graduates (%)	-0.0022***	-0.0026***	-0.0018	-0.0030**	-0.0067***	-0.0072***
	(0.0005)	(0.0006)	(0.0013)	(0.0014)	(0.0013)	(0.0017)
Share of social benefit recipients(%)	-0.0009	-0.0018	0.0016	-0.0015	-0.0044	-0.0024
	(0.0021)	(0.0023)	(0.0052)	(0.0055)	(0.0063)	(0.0072)
Population size(1,000)	-0.0010*	-0.0018**	-0.0026*	-0.0045***	-0.0000	-0.0020
	(0.0006)	(0.0007)	(0.0014)	(0.0016)	(0.0015)	(0.0019)
Share of foreigners (%)	-0.0006*	-0.0010**	-0.0017**	-0.0012	-0.0009	-0.0028**
	(0.0003)	(0.0004)	(0.0008)	(0.0010)	(0.0009)	(0.0012)
Hedonic residual control		-0.2144**		-0.4607*		-0.4800*
		(0.0969)		(0.2374)		(0.2831)
Individual and HH. attributes:						
Age	0.0111***	0.0110***	0.0159***	0.0158***	0.0260***	0.0259***
	(0.0008)	(0.0008)	(0.0017)	(0.0017)	(0.0022)	(0.0022)
Age^2	-0.0882***	-0.0879***	-0.1361***	-0.1352***	-0.1945***	-0.1936***
	(0.0078)	(0.0078)	(0.0165)	(0.0165)	(0.0214)	(0.0213)
Immigrants (dummy)	0.0086	0.0101*	-0.0006	-0.0027	0.0403**	0.0479***
	(0.0059)	(0.0061)	(0.0133)	(0.0136)	(0.0164)	(0.0168)
Female (dummy)	-0.0626***	-0.0627***	-0.0445***	-0.0448***	-0.2011***	-0.2013***
	(0.0039)	(0.0039)	(0.0090)	(0.0090)	(0.0115)	(0.0115)
Married (dummy)	-0.0134**	-0.0135**	-0.0149	-0.0161	-0.0365**	-0.0359**
	(0.0059)	(0.0059)	(0.0127)	(0.0128)	(0.0156)	(0.0156)
High school graduates(dummy)	-0.0168***	-0.0173***	-0.0393***	-0.0395***	-0.0402**	-0.0422***
	(0.0059)	(0.0059)	(0.0134)	(0.0134)	(0.0161)	(0.0160)
College graduates (dummy)	-0.0376***	-0.0375***	-0.0769***	-0.0750***	-0.0769***	-0.0781***
	(0.0070)	(0.0070)	(0.0161)	(0.0161)	(0.0185)	(0.0187)
Not employed (dummy)	0.0016	0.0011	0.0181	0.0173	-0.0030	-0.0040
	(0.0059)	(0.0059)	(0.0128)	(0.0128)	(0.0152)	(0.0153)
Log (Annual HH. Income)	-0.0215***	-0.0209***	-0.0452***	-0.0449***	-0.0423***	-0.0400***
	(0.0039)	(0.0040)	(0.0082)	(0.0082)	(0.0111)	(0.0113)
No. HH. Members	0.0032	0.0028	0.0095	0.0091	0.0066	0.0053
	(0.0030)	(0.0030)	(0.0060)	(0.0061)	(0.0075)	(0.0076)
Constant term	3.2470***	3.2612***	0.3310***	0.3628***	0.4336***	0.4593***
	(0.0442)	(0.0447)	(0.0915)	(0.0920)	(0.1262)	(0.1272)
No. Obs.	6998	6998	6998	6998	6998	6998
R^2	0.1112	0.1099	0.0320	0.0313	0.1105	0.1092

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

B.5 Human capital spillover effects by individual education level

Table B11: Neighborhood education and individual obesity by individual education level: Dependent variable:log(BMI)

	University Graduates		High School Graduates		Lower educated	
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Neighborhood attributes:						
Share of college graduates (%)	-0.0027***	-0.0028***	-0.0021***	-0.0027***	-0.0013	-0.0018
	(0.0007)	(0.0008)	(0.0007)	(0.0009)	(0.0013)	(0.0013)
Share of social benefit recipients(%)	-0.0033	-0.0037	0.0019	0.0009	0.0019	0.0016
	(0.0026)	(0.0026)	(0.0026)	(0.0029)	(0.0042)	(0.0041)
Population size(1,000)	-0.0007	-0.0011	-0.0010	-0.0013	-0.0006	-0.0012
	(0.0009)	(0.0010)	(0.0007)	(0.0008)	(0.0013)	(0.0015)
Share of foreigners (%)	-0.0015***	-0.0014**	-0.0003	-0.0009	-0.0007	-0.0011
	(0.0005)	(0.0006)	(0.0004)	(0.0006)	(0.0007)	(0.0008)
Hedonic residual control		-0.1361*		-0.0806		-0.0574
		(0.0804)		(0.0836)		(0.1487)
Individual and HH. attributes:						
Age	0.0114***	0.0113***	0.0112***	0.0111***	0.0106***	0.0106***
	(0.0016)	(0.0016)	(0.0010)	(0.0010)	(0.0015)	(0.0015)
Age^2	-0.0974***	-0.0972***	-0.0901***	-0.0890***	-0.0787***	-0.0785***
	(0.0153)	(0.0153)	(0.0099)	(0.0098)	(0.0146)	(0.0145)
Immigrants (dummy)	0.0047	0.0039	0.0134*	0.0156**	0.0018	0.0042
	(0.0099)	(0.0100)	(0.0075)	(0.0075)	(0.0109)	(0.0111)
Female (dummy)	-0.0836***	-0.0835***	-0.0668***	-0.0669***	-0.0313***	-0.0310***
	(0.0067)	(0.0067)	(0.0052)	(0.0052)	(0.0092)	(0.0091)
Married (dummy)	-0.0176*	-0.0179**	-0.0082	-0.0077	-0.0290**	-0.0291**
	(0.0091)	(0.0091)	(0.0072)	(0.0072)	(0.0120)	(0.0120)
Not employed (dummy)	0.0073	0.0070	0.0056	0.0057	0.0085	0.0080
	(0.0094)	(0.0093)	(0.0065)	(0.0065)	(0.0114)	(0.0114)
Log (Annual HH. Income)	-0.0206***	-0.0205***	-0.0180***	-0.0171***	-0.0200**	-0.0192**
	(0.0060)	(0.0061)	(0.0052)	(0.0052)	(0.0086)	(0.0087)
No. HH. Members	-0.0021	-0.0022	0.0046	0.0040	0.0063	0.0059
	(0.0042)	(0.0041)	(0.0036)	(0.0036)	(0.0051)	(0.0052)
Year 2010(dummy)	0.0043**	0.0046**	0.0055***	0.0056***	0.0056	0.0060*
	(0.0020)	(0.0020)	(0.0018)	(0.0018)	(0.0035)	(0.0035)
Constant term	3.2434***	3.2488***	3.1766***	3.1859***	3.1878***	3.1949***
	(0.0712)	(0.0712)	(0.0559)	(0.0564)	(0.0951)	(0.0951)
No. Obs.	4050	4050	7196	7196	2665	2665
R^2	0.1273	0.1266	0.1078	0.1066	0.1678	0.1670

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

Table B12: Neighborhood education and individual obesity by individual education level: Dependent variable:Obese(=1 if bmi $\geq$ 30)

	(1)	(2)	(3)	(4)	(5)	(6)
	University Graduates		High School Graduates		Lower educated	
	OLS	2SLS	OLS	2SLS	OLS	2SLS
Neighborhood attributes:						
Share of college graduates (%)	-0.0024	-0.0031*	-0.0022	-0.0033*	-0.0026	-0.0042
	(0.0015)	(0.0018)	(0.0015)	(0.0018)	(0.0030)	(0.0029)
Share of social benefit recipients(%)	-0.0066	-0.0081	0.0111*	0.0121*	-0.0056	-0.0049
	(0.0058)	(0.0061)	(0.0065)	(0.0071)	(0.0116)	(0.0114)
Population size(1,000)	-0.0027	-0.0038*	-0.0021	-0.0022	-0.0025	-0.0021
	(0.0019)	(0.0022)	(0.0015)	(0.0018)	(0.0030)	(0.0032)
Share of foreigners (%)	-0.0028***	-0.0020	-0.0007	-0.0009	-0.0018	-0.0015
	(0.0011)	(0.0013)	(0.0009)	(0.0013)	(0.0015)	(0.0018)
Hedonic residual control		-0.3852*		-0.0538		-0.1283
		(0.2159)		(0.1998)		(0.3609)
Individual and HH. attributes:						
Age	0.0192***	0.0191***	0.0144***	0.0142***	0.0140***	0.0139***
	(0.0033)	(0.0033)	(0.0022)	(0.0022)	(0.0031)	(0.0031)
Age^2	-0.1788***	-0.1780***	-0.1180***	-0.1166***	-0.1155***	-0.1149***
	(0.0321)	(0.0321)	(0.0218)	(0.0219)	(0.0313)	(0.0312)
Immigrants (dummy)	-0.0281	-0.0322	0.0064	0.0076	-0.0021	-0.0027
	(0.0205)	(0.0207)	(0.0175)	(0.0178)	(0.0245)	(0.0243)
Female (dummy)	-0.0518***	-0.0513***	-0.0586***	-0.0587***	0.0001	0.0004
	(0.0139)	(0.0139)	(0.0126)	(0.0125)	(0.0206)	(0.0205)
Married (dummy)	-0.0048	-0.0064	0.0014	0.0019	-0.0563**	-0.0563**
	(0.0196)	(0.0196)	(0.0165)	(0.0165)	(0.0276)	(0.0275)
Not employed (dummy)	0.0474**	0.0465**	0.0074	0.0075	0.0327	0.0327
	(0.0211)	(0.0211)	(0.0150)	(0.0150)	(0.0234)	(0.0233)
Log (Annual HH. Income)	-0.0459***	-0.0462***	-0.0424***	-0.0413***	-0.0250	-0.0235
	(0.0131)	(0.0133)	(0.0105)	(0.0105)	(0.0164)	(0.0165)
No. HH. Members	-0.0051	-0.0052	0.0186**	0.0178**	0.0063	0.0053
	(0.0083)	(0.0083)	(0.0079)	(0.0078)	(0.0096)	(0.0096)
Year 2010(dummy)	0.0026	0.0035	0.0134***	0.0142***	0.0012	0.0027
	(0.0052)	(0.0053)	(0.0050)	(0.0050)	(0.0089)	(0.0091)
Constant term	0.2718*	0.2907*	0.2395**	0.2448**	0.1704	0.1651
	(0.1511)	(0.1511)	(0.1128)	(0.1136)	(0.1877)	(0.1882)
No. Obs.	4050	4050	7196	7196	2665	2665
R^2	0.0277	0.0268	0.0263	0.0259	0.0503	0.0499

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

Table B13: Neighborhood education and individual obesity by individual education level: Dependent variable:Overweight(=1 if bmi $\geq$ 25)

	University Graduates		High School Graduates		Lower educated	
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Neighborhood attributes:						
Share of college graduates (%)	-0.0076***	-0.0083***	-0.0067***	-0.0083***	-0.0037	-0.0049
	(0.0022)	(0.0024)	(0.0018)	(0.0023)	(0.0029)	(0.0032)
Share of social benefit recipients(%)	-0.0106	-0.0119	-0.0016	-0.0031	0.0102	0.0111
	(0.0086)	(0.0089)	(0.0074)	(0.0083)	(0.0102)	(0.0103)
Population size(1,000)	0.0003	-0.0010	-0.0012	-0.0020	0.0036	0.0029
	(0.0027)	(0.0030)	(0.0019)	(0.0024)	(0.0030)	(0.0033)
Share of foreigners (%)	-0.0032**	-0.0032*	-0.0005	-0.0025	-0.0012	-0.0029
	(0.0015)	(0.0018)	(0.0011)	(0.0015)	(0.0017)	(0.0019)
Hedonic residual control		-0.1507		-0.2655		-0.4467
		(0.2695)		(0.2562)		(0.4440)
Individual and HH. attributes:						
Age	0.0302***	0.0301***	0.0269***	0.0265***	0.0213***	0.0213***
	(0.0050)	(0.0050)	(0.0027)	(0.0027)	(0.0037)	(0.0037)
Age^2	-0.2564***	-0.2559***	-0.2033***	-0.1997***	-0.1315***	-0.1314***
	(0.0481)	(0.0481)	(0.0267)	(0.0265)	(0.0356)	(0.0354)
Immigrants (dummy)	0.0061	0.0052	0.0820***	0.0898***	0.0087	0.0178
	(0.0302)	(0.0305)	(0.0197)	(0.0200)	(0.0276)	(0.0281)
Female (dummy)	-0.2514***	-0.2511***	-0.2142***	-0.2148***	-0.1174***	-0.1157***
	(0.0200)	(0.0200)	(0.0147)	(0.0147)	(0.0236)	(0.0235)
Married (dummy)	-0.0624**	-0.0623**	-0.0194	-0.0179	-0.0780**	-0.0780**
	(0.0263)	(0.0264)	(0.0190)	(0.0189)	(0.0310)	(0.0309)
Not employed (dummy)	0.0324	0.0321	0.0112	0.0116	-0.0278	-0.0293
	(0.0274)	(0.0273)	(0.0169)	(0.0169)	(0.0270)	(0.0271)
Log (Annual HH. Income)	-0.0597***	-0.0585***	-0.0306**	-0.0276**	-0.0380*	-0.0358*
	(0.0178)	(0.0178)	(0.0140)	(0.0140)	(0.0208)	(0.0209)
No. HH. Members	-0.0073	-0.0075	0.0082	0.0063	0.0135	0.0120
	(0.0116)	(0.0116)	(0.0093)	(0.0093)	(0.0130)	(0.0132)
Year 2010(dummy)	0.0110	0.0113	0.0031	0.0039	-0.0076	-0.0044
	(0.0083)	(0.0083)	(0.0064)	(0.0065)	(0.0112)	(0.0112)
Constant term	0.5911***	0.6041***	0.2430	0.2655*	0.3579	0.3697
	(0.2154)	(0.2154)	(0.1524)	(0.1531)	(0.2390)	(0.2392)
No. Obs.	4050	4050	7196	7196	2665	2665
R^2	0.1165	0.1161	0.1113	0.1099	0.1667	0.1654

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

B.6 Spillover effects by gender

Table B14: Neighborhood education and individual obesity for men

Dep. Var.:	Log(BMI)	Log(BMI)	Obese	Obese	Overweight	Overweight
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Neighborhood attributes:						
Share of college graduates (%)	-0.0014**	-0.0014*	-0.0017	-0.0020	-0.0050***	-0.0060***
	(0.0006)	(0.0007)	(0.0017)	(0.0019)	(0.0018)	(0.0021)
Share of social benefit recipients(%)	-0.0010	-0.0018	-0.0008	0.0001	-0.0079	-0.0093
	(0.0025)	(0.0026)	(0.0070)	(0.0078)	(0.0075)	(0.0077)
Population size(1,000)	-0.0002	-0.0004	-0.0017	-0.0015	0.0028	0.0026
	(0.0006)	(0.0008)	(0.0017)	(0.0020)	(0.0018)	(0.0021)
Share of foreigners (%)	-0.0010***	-0.0015***	-0.0025***	-0.0028**	-0.0018	-0.0032**
	(0.0004)	(0.0005)	(0.0009)	(0.0012)	(0.0013)	(0.0016)
Hedonic residual control		-0.0952		-0.3253*		-0.2025
		(0.0677)		(0.1890)		(0.2245)
Individual and HH. attributes:						
Age	0.0120***	0.0120***	0.0198***	0.0198***	0.0311***	0.0310***
	(0.0010)	(0.0010)	(0.0024)	(0.0024)	(0.0032)	(0.0032)
Age^2	-0.1032***	-0.1031***	-0.1815***	-0.1813***	-0.2521***	-0.2517***
	(0.0097)	(0.0097)	(0.0232)	(0.0232)	(0.0310)	(0.0309)
Immigrants (dummy)	0.0073	0.0089	-0.0182	-0.0169	0.0500**	0.0550***
	(0.0067)	(0.0068)	(0.0175)	(0.0178)	(0.0204)	(0.0208)
o.Female (dummy)	0.0000		0.0000		0.0000	
	(.)		(.)		(.)	
Married (dummy)	-0.0204***	-0.0201***	-0.0190	-0.0187	-0.0614***	-0.0603***
	(0.0070)	(0.0070)	(0.0178)	(0.0178)	(0.0215)	(0.0215)
High school graduates(dummy)	0.0072	0.0071	-0.0126	-0.0129	0.0028	0.0030
	(0.0073)	(0.0073)	(0.0192)	(0.0191)	(0.0207)	(0.0206)
College graduates (dummy)	-0.0153*	-0.0155*	-0.0704***	-0.0698***	-0.0495**	-0.0481**
	(0.0081)	(0.0081)	(0.0216)	(0.0216)	(0.0245)	(0.0245)
Not employed (dummy)	0.0069	0.0067	0.0416**	0.0414**	-0.0107	-0.0106
	(0.0067)	(0.0067)	(0.0170)	(0.0170)	(0.0196)	(0.0196)
Log (Annual HH. Income)	-0.0044	-0.0039	-0.0137	-0.0129	-0.0035	-0.0015
	(0.0050)	(0.0050)	(0.0112)	(0.0112)	(0.0141)	(0.0141)
No. HH. Members	0.0002	-0.0000	0.0047	0.0039	-0.0036	-0.0050
	(0.0032)	(0.0032)	(0.0078)	(0.0078)	(0.0089)	(0.0089)
Year 2010(dummy)	0.0041**	0.0043***	0.0075	0.0093*	0.0016	0.0025
	(0.0016)	(0.0017)	(0.0051)	(0.0052)	(0.0066)	(0.0067)
Constant term	3.0390***	3.0429***	-0.0796	-0.0825	-0.0888	-0.0815
	(0.0564)	(0.0564)	(0.1265)	(0.1268)	(0.1645)	(0.1646)
No. Obs.	6516	6516	6516	6516	6516	6516
R^2	0.0988	0.0979	0.0289	0.0284	0.0911	0.0901

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

%

Table B15: Neighborhood education and individual obesity for women

Dep. Var.:	Log(BMI)	Log(BMI)	Obese	Obese	Overweight	Overweight
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Neighborhood attributes:						
Share of college graduates (%)	-0.0029***	-0.0037***	-0.0030**	-0.0047***	-0.0082***	-0.0093***
	(0.0007)	(0.0008)	(0.0012)	(0.0015)	(0.0017)	(0.0022)
Share of social benefit recipients(%)	0.0006	0.0000	0.0041	0.0030	0.0009	0.0013
	(0.0029)	(0.0030)	(0.0069)	(0.0069)	(0.0073)	(0.0079)
Population size(1,000)	-0.0015*	-0.0021**	-0.0030*	-0.0039**	-0.0023	-0.0040
	(0.0008)	(0.0010)	(0.0015)	(0.0018)	(0.0021)	(0.0026)
Share of foreigners (%)	-0.0005	-0.0007	-0.0007	-0.0002	-0.0010	-0.0023*
	(0.0005)	(0.0006)	(0.0009)	(0.0011)	(0.0012)	(0.0014)
Hedonic residual control		-0.0772		-0.0025		-0.3219
		(0.0849)		(0.1876)		(0.2745)
Individual and HH. attributes:						
age	0.0106***	0.0105***	0.0122***	0.0121***	0.0216***	0.0215***
	(0.0010)	(0.0010)	(0.0020)	(0.0020)	(0.0025)	(0.0025)
Age^2	-0.0802***	-0.0795***	-0.0976***	-0.0964***	-0.1489***	-0.1475***
	(0.0100)	(0.0099)	(0.0199)	(0.0199)	(0.0252)	(0.0251)
Immigrants (dummy)	0.0120	0.0129	0.0154	0.0133	0.0463**	0.0522**
	(0.0079)	(0.0081)	(0.0160)	(0.0163)	(0.0203)	(0.0206)
Married (dummy)	-0.0187***	-0.0185***	-0.0167	-0.0170	-0.0432**	-0.0425**
	(0.0070)	(0.0071)	(0.0144)	(0.0144)	(0.0180)	(0.0180)
High school graduates(dummy)	-0.0262***	-0.0264***	-0.0546***	-0.0537***	-0.0662***	-0.0676***
	(0.0075)	(0.0075)	(0.0162)	(0.0161)	(0.0191)	(0.0190)
College graduates (dummy)	-0.0483***	-0.0470***	-0.0716***	-0.0678***	-0.1027***	-0.1021***
	(0.0093)	(0.0093)	(0.0191)	(0.0192)	(0.0237)	(0.0238)
Not employed (dummy)	0.0065	0.0063	0.0118	0.0115	0.0221	0.0214
	(0.0068)	(0.0068)	(0.0134)	(0.0134)	(0.0176)	(0.0176)
Log (Annual HH. Income)	-0.0318***	-0.0307***	-0.0598***	-0.0587***	-0.0676***	-0.0647***
	(0.0050)	(0.0050)	(0.0094)	(0.0094)	(0.0127)	(0.0127)
No. HH. Members	0.0043	0.0038	0.0115*	0.0111*	0.0094	0.0082
	(0.0034)	(0.0034)	(0.0064)	(0.0064)	(0.0085)	(0.0086)
Year 2010(dummy)	0.0058***	0.0061***	0.0079*	0.0080*	0.0044	0.0058
	(0.0017)	(0.0018)	(0.0046)	(0.0046)	(0.0061)	(0.0062)
Constant term	3.3002***	3.3082***	0.5116***	0.5245***	0.6180***	0.6341***
	(0.0546)	(0.0552)	(0.1018)	(0.1022)	(0.1446)	(0.1461)
No. Obs.	7395	7395	7395	7395	7395	7395
R^2	0.1093	0.1085	0.0383	0.0376	0.0916	0.0908

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

B.7 Spillover effects in West Germany and East Germany

Table B16: Neighborhood education and individual obesity in East German

Dep. Var.:	Log(BMI)	Log(BMI)	Obese	Obese	Overweight	Overweight
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Neighborhood attributes:						
Share of college graduates (%)	-0.0031**	-0.0014*	-0.0063**	-0.0078	-0.0087**	-0.0010
	(0.0012)	(0.0007)	(0.0028)	(0.0070)	(0.0037)	(0.0093)
Share of social benefit recipients(%)	-0.0010	-0.0018	0.0094	0.0099	-0.0110	-0.0076
	(0.0049)	(0.0026)	(0.0117)	(0.0129)	(0.0108)	(0.0143)
Population size(1,000)	0.0008	-0.0004	-0.0046	-0.0106*	0.0030	0.0035
	(0.0020)	(0.0008)	(0.0048)	(0.0060)	(0.0051)	(0.0076)
Share of foreigners (%)	-0.0044**	-0.0015***	-0.0078*	-0.0078	-0.0137**	-0.0381
	(0.0020)	(0.0005)	(0.0040)	(0.0271)	(0.0060)	(0.0326)
Hedonic residual control		-0.0952		0.0863		0.4379
		(0.0677)		(0.2761)		(0.3392)
Individual and HH. attributes:						
Age	0.0096***	0.0120***	0.0175***	0.0178***	0.0194***	0.0197***
	(0.0024)	(0.0010)	(0.0049)	(0.0049)	(0.0057)	(0.0057)
Age^2	-0.0697***	-0.1031***	-0.1427***	-0.1457***	-0.1175**	-0.1222**
	(0.0231)	(0.0097)	(0.0487)	(0.0491)	(0.0574)	(0.0574)
Immigrants (dummy)	-0.0379	0.0089	-0.1054**	-0.1030**	-0.0416	-0.0213
	(0.0263)	(0.0068)	(0.0426)	(0.0478)	(0.0779)	(0.0823)
Female (dummy)	-0.0393***		-0.0072	-0.0070	-0.1389***	-0.1393***
	(0.0095)		(0.0237)	(0.0234)	(0.0262)	(0.0261)
Married (dummy)	-0.0391***	-0.0201***	-0.0283	-0.0274	-0.1110***	-0.1130***
	(0.0149)	(0.0070)	(0.0349)	(0.0338)	(0.0406)	(0.0397)
High school graduates(dummy)	-0.0256	0.0071	-0.0834*	-0.0846*	-0.0567	-0.0525
	(0.0200)	(0.0073)	(0.0464)	(0.0471)	(0.0468)	(0.0466)
College graduates (dummy)	-0.0316	-0.0155*	-0.1081**	-0.1088**	-0.0568	-0.0531
	(0.0221)	(0.0081)	(0.0518)	(0.0526)	(0.0548)	(0.0553)
Not employed (dummy)	-0.0056	0.0067	-0.0113	-0.0119	-0.0171	-0.0143
	(0.0120)	(0.0067)	(0.0267)	(0.0264)	(0.0324)	(0.0319)
Log (Annual HH. Income)	-0.0419***	-0.0039	-0.0495**	-0.0478**	-0.1012***	-0.1054***
	(0.0104)	(0.0050)	(0.0224)	(0.0233)	(0.0283)	(0.0293)
No. HH. Members	0.0123	-0.0000	0.0015	0.0019	0.0198	0.0159
	(0.0077)	(0.0032)	(0.0148)	(0.0148)	(0.0157)	(0.0147)
Year 2010(dummy)	0.0016	0.0043***	0.0136	0.0122	-0.0128	-0.0215
	(0.0042)	(0.0017)	(0.0114)	(0.0112)	(0.0137)	(0.0152)
Constant term	3.4529***	3.0429***	0.4285*	0.4840*	1.1567***	1.1887***
	(0.1110)	(0.0564)	(0.2524)	(0.2653)	(0.3385)	(0.3508)
No. Obs.	1896	6516	1896	1896	1896	1896
R^2	0.1417	0.0979	0.0500	0.0473	0.1397	0.1288

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

Table B17: Neighborhood education and individual obesity in West German

Dep. Var.:	Log(BMI)	Log(BMI)	Obese	Obese	Overweight	Overweight
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Neighborhood attributes:						
educplz	-0.0019***	-0.0023***	-0.0015	-0.0023*	-0.0059***	-0.0071***
	(0.0006)	(0.0006)	(0.0013)	(0.0014)	(0.0014)	(0.0017)
welshare	-0.0002	0.0005	-0.0004	0.0012	-0.0018	-0.0003
	(0.0022)	(0.0023)	(0.0052)	(0.0055)	(0.0060)	(0.0064)
size1	-0.0010*	-0.0011*	-0.0024*	-0.0022	0.0000	-0.0007
	(0.0006)	(0.0007)	(0.0013)	(0.0015)	(0.0015)	(0.0017)
forshare	-0.0007**	-0.0011**	-0.0013*	-0.0013	-0.0012	-0.0028**
	(0.0004)	(0.0004)	(0.0008)	(0.0009)	(0.0009)	(0.0011)
Individual and HH. attributes:						
Age	0.0116***	0.0115***	0.0152***	0.0151***	0.0271***	0.0270***
	(0.0008)	(0.0008)	(0.0016)	(0.0016)	(0.0021)	(0.0021)
Age^2	-0.0929***	-0.0927***	-0.1298***	-0.1293***	-0.2048***	-0.2042***
	(0.0075)	(0.0075)	(0.0163)	(0.0162)	(0.0206)	(0.0205)
Immigrants (dummy)	0.0108*	0.0120**	0.0017	0.0017	0.0492***	0.0539***
	(0.0057)	(0.0058)	(0.0130)	(0.0130)	(0.0155)	(0.0157)
Female (dummy)	-0.0671***	-0.0670***	-0.0497***	-0.0496***	-0.2118***	-0.2115***
	(0.0041)	(0.0041)	(0.0091)	(0.0091)	(0.0116)	(0.0116)
Married (dummy)	-0.0108*	-0.0105*	-0.0074	-0.0072	-0.0299*	-0.0285*
	(0.0058)	(0.0058)	(0.0124)	(0.0124)	(0.0153)	(0.0152)
High school graduates(dummy)	-0.0154***	-0.0155***	-0.0387***	-0.0389***	-0.0445***	-0.0451***
	(0.0056)	(0.0055)	(0.0127)	(0.0126)	(0.0150)	(0.0150)
College graduates (dummy)	-0.0389***	-0.0381***	-0.0745***	-0.0729***	-0.0926***	-0.0901***
	(0.0067)	(0.0067)	(0.0153)	(0.0154)	(0.0179)	(0.0180)
Not employed (dummy)	0.0045	0.0045	0.0223*	0.0224*	-0.0010	-0.0009
	(0.0054)	(0.0054)	(0.0119)	(0.0119)	(0.0139)	(0.0140)
Log (Annual HH. Income)	-0.0192***	-0.0187***	-0.0413***	-0.0404***	-0.0386***	-0.0370***
	(0.0039)	(0.0039)	(0.0075)	(0.0075)	(0.0105)	(0.0106)
No. HH. Members	0.0020	0.0016	0.0108*	0.0100*	0.0042	0.0027
	(0.0029)	(0.0029)	(0.0058)	(0.0058)	(0.0073)	(0.0074)
Year 2010(dummy)	0.0051***	0.0056***	0.0061*	0.0073**	0.0038	0.0055
	(0.0013)	(0.0014)	(0.0036)	(0.0037)	(0.0049)	(0.0050)
Constant term	3.2085***	3.2125***	0.2908***	0.2863***	0.3742***	0.3937***
	(0.0429)	(0.0431)	(0.0832)	(0.0828)	(0.1194)	(0.1204)
No. Obs.	12015	12015	12015	12015	12015	12015
R^2	0.1234	0.1227	0.0306	0.0303	0.1182	0.1171
No. Obs.	12015	12015	12015	12015	12015	12015
R^2	0.1234	0.1227	0.0306	0.0303	0.1182	0.1171

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

B.7.1 Spillover effects by migration status

Table B18: Neighborhood education and individual obesity for Immigrants

Dep. Var.:	Log(BMI)	Log(BMI)	Obese	Obese	Overweight	Overweight
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Neighborhood attributes:						
Share of college graduates (%)	-0.0011	-0.0012	-0.0010	-0.0014	-0.0048*	-0.0054*
	(0.0012)	(0.0012)	(0.0029)	(0.0029)	(0.0027)	(0.0030)
Share of social benefit recipients(%)	0.0020	0.0012	0.0036	0.0010	0.0074	0.0065
	(0.0033)	(0.0033)	(0.0085)	(0.0083)	(0.0083)	(0.0086)
Population size(1,000)	0.0006	0.0003	-0.0018	-0.0016	0.0049*	0.0041
	(0.0011)	(0.0012)	(0.0027)	(0.0029)	(0.0029)	(0.0032)
Share of foreigners (%)	-0.0002	0.0001	-0.0002	0.0002	-0.0012	-0.0006
	(0.0007)	(0.0007)	(0.0015)	(0.0016)	(0.0017)	(0.0018)
Hedonic residual control		0.0396		0.0060		0.1887
		(0.0911)		(0.2319)		(0.3233)
Individual and HH. attributes:						
Age	0.0113***	0.0113***	0.0134***	0.0134***	0.0252***	0.0253***
	(0.0018)	(0.0018)	(0.0037)	(0.0037)	(0.0046)	(0.0046)
Age^2	-0.0812***	-0.0814***	-0.0939**	-0.0943**	-0.1677***	-0.1686***
	(0.0178)	(0.0178)	(0.0384)	(0.0384)	(0.0468)	(0.0468)
Female (dummy)	-0.0504***	-0.0504***	-0.0030	-0.0030	-0.1775***	-0.1776***
	(0.0088)	(0.0088)	(0.0187)	(0.0187)	(0.0244)	(0.0243)
Married (dummy)	-0.0300**	-0.0304**	-0.0470*	-0.0472*	-0.0866***	-0.0875***
	(0.0129)	(0.0129)	(0.0250)	(0.0250)	(0.0331)	(0.0330)
High school graduates(dummy)	-0.0076	-0.0074	-0.0198	-0.0198	0.0002	0.0007
	(0.0099)	(0.0098)	(0.0230)	(0.0229)	(0.0283)	(0.0281)
College graduates (dummy)	-0.0415***	-0.0413***	-0.0860***	-0.0853***	-0.1124***	-0.1115***
	(0.0133)	(0.0132)	(0.0294)	(0.0293)	(0.0357)	(0.0356)
Not employed (dummy)	-0.0087	-0.0085	0.0200	0.0202	-0.0478*	-0.0473*
	(0.0106)	(0.0105)	(0.0232)	(0.0231)	(0.0288)	(0.0286)
Log (Annual HH. Income)	-0.0241***	-0.0237***	-0.0625***	-0.0619***	-0.0305	-0.0290
	(0.0086)	(0.0085)	(0.0161)	(0.0159)	(0.0223)	(0.0222)
No. HH. Members	0.0033	0.0033	0.0134	0.0132	0.0035	0.0034
	(0.0054)	(0.0054)	(0.0102)	(0.0102)	(0.0132)	(0.0132)
Year 2010(dummy)	0.0057**	0.0054*	0.0066	0.0061	-0.0026	-0.0033
	(0.0028)	(0.0029)	(0.0085)	(0.0085)	(0.0102)	(0.0103)
Constant term	3.2170***	3.2138***	0.4520**	0.4452**	0.2772	0.2674
	(0.0926)	(0.0919)	(0.1830)	(0.1797)	(0.2472)	(0.2459)
No. Obs.	2431	2431	2431	2431	2431	2431
R^2	0.1821	0.1817	0.0636	0.0631	0.1641	0.1635

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

Table B19: Neighborhood education and individual obesity for Germans

Dep. Var.:	Log(BMI)	Log(BMI)	Obese	Obese	Overweight	Overweight
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Neighborhood attributes:						
Share of college graduates (%)	-0.0025***	-0.0030***	-0.0026**	-0.0038***	-0.0072***	-0.0085***
	(0.0006)	(0.0007)	(0.0012)	(0.0013)	(0.0015)	(0.0018)
Share of social benefit recipients(%)	-0.0005	-0.0014	0.0016	0.0018	-0.0053	-0.0070
	(0.0021)	(0.0022)	(0.0050)	(0.0052)	(0.0059)	(0.0064)
Population size(1,000)	-0.0012*	-0.0017**	-0.0025*	-0.0031*	-0.0009	-0.0019
	(0.0006)	(0.0007)	(0.0014)	(0.0016)	(0.0016)	(0.0019)
Share of foreigners (%)	-0.0008**	-0.0014***	-0.0019**	-0.0020**	-0.0012	-0.0032***
	(0.0003)	(0.0005)	(0.0008)	(0.0010)	(0.0009)	(0.0012)
Hedonic residual control		-0.1114*		-0.2009		-0.3494*
		(0.0663)		(0.1659)		(0.2094)
Individual and HH. attributes:						
Share of college graduates (%)	-0.0025***	-0.0030***	-0.0026**	-0.0038***	-0.0072***	-0.0085***
	(0.0006)	(0.0007)	(0.0012)	(0.0013)	(0.0015)	(0.0018)
Share of social benefit recipients(%)	-0.0005	-0.0014	0.0016	0.0018	-0.0053	-0.0070
	(0.0021)	(0.0022)	(0.0050)	(0.0052)	(0.0059)	(0.0064)
Population size(1,000)	-0.0012*	-0.0017**	-0.0025*	-0.0031*	-0.0009	-0.0019
	(0.0006)	(0.0007)	(0.0014)	(0.0016)	(0.0016)	(0.0019)
Share of foreigners (%)	-0.0008**	-0.0014***	-0.0019**	-0.0020**	-0.0012	-0.0032***
	(0.0003)	(0.0005)	(0.0008)	(0.0010)	(0.0009)	(0.0012)
Age	0.0110***	0.0110***	0.0152***	0.0151***	0.0261***	0.0259***
	(0.0008)	(0.0008)	(0.0017)	(0.0017)	(0.0022)	(0.0022)
Age^2	-0.0888***	-0.0883***	-0.1318***	-0.1307***	-0.1968***	-0.1953***
	(0.0082)	(0.0082)	(0.0173)	(0.0173)	(0.0214)	(0.0213)
Female (dummy)	-0.0657***	-0.0656***	-0.0519***	-0.0516***	-0.2060***	-0.2057***
	(0.0042)	(0.0042)	(0.0095)	(0.0095)	(0.0117)	(0.0117)
Married (dummy)	-0.0114*	-0.0110*	-0.0034	-0.0034	-0.0325**	-0.0313**
	(0.0059)	(0.0059)	(0.0132)	(0.0133)	(0.0157)	(0.0157)
High school graduates(dummy)	-0.0180***	-0.0180***	-0.0440***	-0.0437***	-0.0579***	-0.0584***
	(0.0064)	(0.0064)	(0.0147)	(0.0146)	(0.0164)	(0.0164)
College graduates (dummy)	-0.0365***	-0.0359***	-0.0739***	-0.0715***	-0.0831***	-0.0817***
	(0.0073)	(0.0073)	(0.0168)	(0.0169)	(0.0193)	(0.0194)
Not employed (dummy)	0.0075	0.0073	0.0191	0.0189	0.0126	0.0119
	(0.0056)	(0.0056)	(0.0124)	(0.0124)	(0.0148)	(0.0149)
Log (Annual HH. Income)	-0.0189***	-0.0175***	-0.0357***	-0.0342***	-0.0453***	-0.0412***
	(0.0041)	(0.0041)	(0.0084)	(0.0084)	(0.0115)	(0.0115)
No. HH. Members	0.0033	0.0026	0.0085	0.0076	0.0068	0.0045
	(0.0030)	(0.0030)	(0.0063)	(0.0063)	(0.0076)	(0.0076)
Year 2010(dummy)	0.0049***	0.0052***	0.0080**	0.0092**	0.0044	0.0056
	(0.0014)	(0.0014)	(0.0037)	(0.0037)	(0.0052)	(0.0053)
Constant term	3.2247***	3.2297***	0.2616***	0.2669***	0.4882***	0.4967***
	(0.0461)	(0.0465)	(0.0929)	(0.0933)	(0.1302)	(0.1308)
No. Obs.	11480	11480	11480	11480	11480	11480
R^2	0.1136	0.1123	0.0282	0.0278	0.1117	0.1103

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

B.8 Spillover effects by local human captial concentration

Table B20: Outcome variable: Log(BMI)

Neighborhood human capital concentration:	% College share ≥ 10		% College share 5–10		% College share ≤ 5	
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Neighborhood attributes:						
Share of college graduates (%)	-0.0011	-0.0027*	-0.0041**	-0.0073**	0.0030	0.0169
	(0.0012)	(0.0014)	(0.0020)	(0.0034)	(0.0061)	(0.0200)
Share of social benefit recipients(%)	0.0025	0.0057	-0.0028	-0.0049*	0.0039	0.0059
	(0.0066)	(0.0073)	(0.0024)	(0.0025)	(0.0030)	(0.0038)
Population size(1,000)	0.0002	0.0002	-0.0010	-0.0015*	-0.0007	-0.0004
	(0.0012)	(0.0014)	(0.0007)	(0.0008)	(0.0014)	(0.0017)
Share of foreigners (%)	-0.0005	-0.0012*	-0.0007	-0.0013**	-0.0006	0.0006
	(0.0005)	(0.0007)	(0.0005)	(0.0006)	(0.0007)	(0.0011)
Hedonic residual control	-0.0535	-0.1135	-0.0134	-0.1806**	0.0624	0.0691
	(0.0984)	(0.1548)	(0.0518)	(0.0772)	(0.0686)	(0.1066)
Individual and HH. attributes:						
Age	0.0132***	0.0131***	0.0099***	0.0099***	0.0124***	0.0124***
	(0.0016)	(0.0016)	(0.0009)	(0.0009)	(0.0016)	(0.0016)
Age^2	-0.1095***	-0.1086***	-0.0763***	-0.0762***	-0.0994***	-0.0996***
	(0.0157)	(0.0156)	(0.0091)	(0.0091)	(0.0158)	(0.0159)
Immigrants (dummy)	0.0162	0.0180*	0.0038	0.0063	0.0090	0.0076
	(0.0105)	(0.0106)	(0.0078)	(0.0079)	(0.0112)	(0.0119)
Female (dummy)	-0.0741***	-0.0738***	-0.0632***	-0.0630***	-0.0480***	-0.0478***
	(0.0079)	(0.0078)	(0.0049)	(0.0049)	(0.0083)	(0.0082)
Married (dummy)	-0.0082	-0.0069	-0.0187***	-0.0180**	-0.0142	-0.0145
	(0.0123)	(0.0123)	(0.0071)	(0.0071)	(0.0109)	(0.0109)
High school graduates(dummy)	-0.0213*	-0.0217*	-0.0142**	-0.0145**	-0.0181*	-0.0187*
	(0.0121)	(0.0120)	(0.0072)	(0.0072)	(0.0099)	(0.0100)
College graduates (dummy)	-0.0536***	-0.0526***	-0.0303***	-0.0302***	-0.0316**	-0.0327**
	(0.0136)	(0.0137)	(0.0084)	(0.0083)	(0.0134)	(0.0135)
Not employed (dummy)	0.0098	0.0087	0.0005	0.0005	0.0040	0.0031
	(0.0108)	(0.0108)	(0.0065)	(0.0065)	(0.0104)	(0.0104)
Log (Annual HH. Income)	-0.0162**	-0.0151**	-0.0232***	-0.0221***	-0.0187***	-0.0189***
	(0.0066)	(0.0067)	(0.0053)	(0.0053)	(0.0071)	(0.0070)
No. HH. Members	0.0024	0.0018	0.0027	0.0024	0.0048	0.0054
	(0.0049)	(0.0049)	(0.0040)	(0.0039)	(0.0049)	(0.0049)
Year 2010(dummy)	0.0053*	0.0066**	0.0040**	0.0045**	0.0077**	0.0078**
	(0.0031)	(0.0032)	(0.0019)	(0.0020)	(0.0035)	(0.0037)
Constant term	3.1199***	3.1410***	3.3019***	3.3266***	3.1379***	3.0658***
	(0.0740)	(0.0751)	(0.0601)	(0.0620)	(0.0830)	(0.1242)
No. Obs.	3444	3444	7602	7602	2865	2865
R^2	0.1340	0.1318	0.1106	0.1082	0.1154	0.1112

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

Table B21: Outcome variable: Obese (=1 if BMI $\geq$ 30)

Neighborhood human capital concentration:	% College share $\geq$ 10		% College share 5–10		% College share $\leq$ 5	
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Neighborhood attributes:						
Share of college graduates (%)	0.0013	-0.0024	-0.0058	-0.0086	-0.0018	-0.0167
	(0.0026)	(0.0032)	(0.0048)	(0.0080)	(0.0135)	(0.0464)
Share of social benefit recipients(%)	0.0046	0.0067	-0.0023	-0.0047	0.0073	0.0112
	(0.0164)	(0.0181)	(0.0059)	(0.0061)	(0.0069)	(0.0088)
Population size(1,000)	0.0015	0.0002	-0.0030*	-0.0044**	-0.0025	0.0027
	(0.0027)	(0.0031)	(0.0016)	(0.0019)	(0.0034)	(0.0038)
Share of foreigners (%)	-0.0009	-0.0018	-0.0019**	-0.0019	-0.0009	0.0002
	(0.0012)	(0.0015)	(0.0010)	(0.0013)	(0.0015)	(0.0025)
Hedonic residual control	-0.0198	-0.1890	-0.0437	-0.2858	-0.0565	0.0891
	(0.1976)	(0.3134)	(0.1357)	(0.2139)	(0.1726)	(0.2488)
Individual and HH. attributes:						
Age	0.0182***	0.0179***	0.0135***	0.0136***	0.0170***	0.0169***
	(0.0029)	(0.0029)	(0.0021)	(0.0021)	(0.0037)	(0.0037)
Age^2	-0.1569***	-0.1546***	-0.1128***	-0.1133***	-0.1467***	-0.1462***
	(0.0294)	(0.0293)	(0.0205)	(0.0205)	(0.0366)	(0.0374)
Immigrants (dummy)	0.0072	0.0102	-0.0141	-0.0142	0.0116	0.0035
	(0.0207)	(0.0213)	(0.0177)	(0.0179)	(0.0275)	(0.0277)
Female (dummy)	-0.0486***	-0.0484***	-0.0433***	-0.0433***	-0.0355*	-0.0362*
	(0.0156)	(0.0155)	(0.0112)	(0.0112)	(0.0206)	(0.0206)
Married (dummy)	0.0211	0.0228	-0.0176	-0.0176	-0.0324	-0.0325
	(0.0219)	(0.0218)	(0.0158)	(0.0160)	(0.0264)	(0.0264)
High school graduates(dummy)	-0.0445*	-0.0447*	-0.0447***	-0.0443***	-0.0326	-0.0304
	(0.0264)	(0.0262)	(0.0161)	(0.0160)	(0.0265)	(0.0267)
College graduates (dummy)	-0.0941***	-0.0918***	-0.0647***	-0.0636***	-0.0747**	-0.0734**
	(0.0288)	(0.0288)	(0.0189)	(0.0190)	(0.0363)	(0.0361)
Not employed (dummy)	0.0307	0.0286	0.0076	0.0078	0.0345	0.0360
	(0.0215)	(0.0215)	(0.0145)	(0.0144)	(0.0255)	(0.0256)
Log (Annual HH. Income)	-0.0167	-0.0145	-0.0532***	-0.0524***	-0.0464***	-0.0455***
	(0.0141)	(0.0143)	(0.0097)	(0.0096)	(0.0159)	(0.0156)
No. HH. Members	0.0038	0.0027	0.0102	0.0102	0.0128	0.0123
	(0.0094)	(0.0093)	(0.0080)	(0.0080)	(0.0109)	(0.0106)
Year 2010(dummy)	0.0131*	0.0151**	0.0024	0.0030	0.0155*	0.0179*
	(0.0068)	(0.0070)	(0.0050)	(0.0050)	(0.0094)	(0.0098)
Constant term	-0.1290	-0.0692	0.5116***	0.5378***	0.2758	0.2603
	(0.1421)	(0.1481)	(0.1097)	(0.1128)	(0.1889)	(0.2862)
No. Obs.	3444	3444	7602	7602	2865	2865
R^2	0.0329	0.0309	0.0283	0.0276	0.0289	0.0254

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.

Table B22: Outcome variable (=1 if BMI $\geq$ 25)

Neighborhood human capital concentration:	% College share $\geq$ 10		% College share 5–10		% College share $\leq$ 5	
	OLS	2SLS	OLS	2SLS	OLS	2SLS
	(1)	(2)	(3)	(4)	(5)	(6)
Neighborhood attributes:						
Share of college graduates (%)	-0.0052*	-0.0095**	-0.0142***	-0.0237**	0.0133	0.0400
	(0.0029)	(0.0037)	(0.0052)	(0.0094)	(0.0155)	(0.0532)
Share of social benefit recipients(%)	-0.0062	-0.0050	-0.0080	-0.0090	0.0062	0.0083
	(0.0180)	(0.0198)	(0.0067)	(0.0073)	(0.0083)	(0.0103)
Population size(1,000)	0.0033	0.0042	-0.0009	-0.0012	0.0032	-0.0004
	(0.0030)	(0.0038)	(0.0018)	(0.0021)	(0.0034)	(0.0041)
Share of foreigners (%)	-0.0004	-0.0020	-0.0015	-0.0037***	-0.0013	0.0005
	(0.0014)	(0.0018)	(0.0011)	(0.0014)	(0.0017)	(0.0029)
Hedonic residual control	-0.1219	-0.2968	-0.1750	-0.4944**	0.2881	0.1093
	(0.2686)	(0.4482)	(0.1841)	(0.2506)	(0.2239)	(0.3554)
Individual and HH. attributes:						
Age	0.0307***	0.0304***	0.0220***	0.0219***	0.0312***	0.0312***
	(0.0038)	(0.0038)	(0.0026)	(0.0026)	(0.0044)	(0.0044)
Age^2	-0.2424***	-0.2401***	-0.1532***	-0.1522***	-0.2404***	-0.2397***
	(0.0381)	(0.0380)	(0.0254)	(0.0254)	(0.0439)	(0.0440)
Immigrants (dummy)	0.0445	0.0472*	0.0396*	0.0493**	0.0561*	0.0568*
	(0.0280)	(0.0281)	(0.0211)	(0.0213)	(0.0312)	(0.0322)
Female (dummy)	-0.2209***	-0.2200***	-0.2061***	-0.2057***	-0.1615***	-0.1608***
	(0.0226)	(0.0225)	(0.0140)	(0.0140)	(0.0225)	(0.0223)
Married (dummy)	-0.0251	-0.0216	-0.0603***	-0.0578***	-0.0160	-0.0165
	(0.0290)	(0.0288)	(0.0191)	(0.0191)	(0.0310)	(0.0311)
High school graduates(dummy)	-0.0516*	-0.0525*	-0.0429**	-0.0441**	-0.0490*	-0.0512*
	(0.0313)	(0.0312)	(0.0184)	(0.0184)	(0.0291)	(0.0293)
College graduates (dummy)	-0.1158***	-0.1120***	-0.0791***	-0.0803***	-0.0502	-0.0517
	(0.0337)	(0.0340)	(0.0225)	(0.0225)	(0.0380)	(0.0386)
Not employed (dummy)	0.0206	0.0176	-0.0084	-0.0082	-0.0090	-0.0119
	(0.0264)	(0.0266)	(0.0171)	(0.0171)	(0.0275)	(0.0275)
Log (Annual HH. Income)	-0.0300*	-0.0275	-0.0551***	-0.0516***	-0.0292	-0.0296
	(0.0177)	(0.0178)	(0.0143)	(0.0144)	(0.0202)	(0.0201)
No. HH. Members	0.0132	0.0113	0.0037	0.0021	0.0027	0.0040
	(0.0126)	(0.0126)	(0.0097)	(0.0097)	(0.0129)	(0.0129)
Year 2010(dummy)	0.0026	0.0043	0.0062	0.0081	-0.0047	-0.0051
	(0.0108)	(0.0110)	(0.0065)	(0.0067)	(0.0114)	(0.0116)
Constant term	0.1510	0.2058	0.7411***	0.7951***	0.0353	-0.0525
	(0.2081)	(0.2102)	(0.1611)	(0.1647)	(0.2487)	(0.3562)
No. Obs.	3444	3444	7602	7602	2865	2865
R^2	0.1241	0.1223	0.1146	0.1125	0.1048	0.1025

Standard errors in parentheses are robust and clustered on 1,379 postal areas. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$
SOURCE.–SOEP v29, the neighborhood data from IAB and *Immobilienscout24*, own calculations.