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# Neighborhoods and youth health: Everybody needs good neighbors?

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IFAU INSTITUTET FÖR ARBETSMARKNADS- OCH UTBILDNINGSPOLITISK UTVÄRDERING

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# Neighborhoods and Youth Health: Everybody Needs Good Neighbors?[a]

by

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## Abstract

There are large differences in health across neighborhoods in Sweden. To try to answer if there is a causal link between neighborhood conditions in childhood and youth health, I apply two different empirical strategies. First, I use population wide data on families living in different areas in Sweden, and estimate the effects of childhood neighborhood on youth health using data on families that move across the country. Since the choice of moving and where to live is endogenous, I exploit the timing of moves and estimate the effect of siblings' different exposure time to neighborhoods. The second approach utilizes a governmental policy that assigned refugees to their initial neighborhood in Sweden, potentially offering exogenous variation in neighborhoods and allowing me to study the effect of different neighborhoods on youth health. The findings from the two strategies together imply that there are significant neighborhoods effects on youth health, but that the effects are contemporaneous and there is no evidence of exposure time effects.

Keywords: Health, Inequality, Neighborhoods, Childhood
JEL-codes: I14, R00, J62

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## 1 Introduction

There are large differences in health status across countries, but health also differs within countries and across groups of people (World Health Organization, 2008). This is also true in Sweden where life expectancy differs by approximately 4 years between areas with the highest and lowest longevity (Statistics Sweden, 2016). Is there a causal link between neighborhoods and health, or do people sort across areas in a way that produces these health disparities? There is plenty of evidence suggesting that the early years in life are important in forming later health outcomes (e.g. Heckman, 2007), therefore it is particularly relevant to study to what extent neighborhoods shape the accumulation of health capital among children and adolescents. This is also the aim of this paper.

There are several reasons why neighborhoods might influence the accumulation of health capital. The seminal work by Jencks and Mayer (1990) identifies four potentially important mechanisms: Peer effects, neighborhood role models, monitoring, and community resources. Peer effects related to health outcomes among adolescents could operate through learning risky behavior from friends such as drinking, smoking or having unsafe sex (see Card and Giuliano, 2013, on peer effects and sexual activity; Kremer and Levy, 2008, on alcohol; and Damm and Dustmann, 2014, on social interaction and criminal behavior). Peer effects could also be positive for health outcomes if it increases, for example physical activities, such as sports. Adult influences could work very much in the same way as peer effects by providing good or bad role models. The quality of local institutions, such as schools and health care, is potentially also important (Aizer and Currie, 2004). Other types of neighborhood characteristics could also matter for health outcomes such as proximity of gyms, parks and roads. The possibility of exercising nearby in a park or in a gym is probably beneficial for health, while living next to a highway is likely to be detrimental for health due to air pollution.

On average, residents living in poor areas have worse health than residents in more affluent areas. This relationship might not be causal since it is likely that there are factors that impact both families' residential location and children's health, such as family background. In other words, we cannot make any causal claims regarding neighborhood effects by simply comparing children growing up in different areas. This paper utilizes two different methods to try to handle the problem of selection. In the first part of the paper I use population wide data and estimate the effects of neighborhoods on youth health using data on families that move across the country. More specifically, I study whether children moving to areas where children have worse health outcomes when growing up, will experience deteriorated health in adolescence themselves. Since the choice of moving and where to live is endogenous, I exploit the timing of moves and compare children of different ages that move into a neighborhood.[1] My data allow me to identify families which make it possible to control for family fixed effects. This way I am effectively utilizing the variation in siblings' different exposure time to an area to identify neighborhood effects. The importance of parental income varies across areas in Sweden; therefore, I will also study neighborhood effects on youth health allowing the effect to vary with family income.

In the second part of the paper I utilize a governmental policy that assigned refugees to their initial neighborhood in Sweden. This policy was in place during the period 1985-1994, and meant that authorities placed refugees in suitable neighborhoods in a way that in practice offered potentially exogenous variation in neighborhoods, and allows me to study the effect of different areas on youth health.[2]

Studying movers and exposure time for areas has the advantage of estimating neighborhood effects from the entire distribution of Swedish families and places. This arguably offers high generalizability of the results. The more selective sample in the second part might of course limit the scope for generalization of the results, but the quasi-experimental design of the placement policy should on the other hand increase internal validity. Refugees are also a very interesting to study as they in most societies represent one of the most socioeconomically disadvantaged groups (e.g. OECD, 2017), and hence are potentially more susceptible to the neighborhood.

This paper documents large differences in the rate of hospitalized youth across areas in Sweden. Family income is also important for youth health, and the effect varies over the country. The first part of this paper, which uses movers across areas, confirms the association between neighborhoods and health found in previous studies. However, no statistically significant effects are found for exposure time to neighborhoods using

[1] The first part of the paper follows quite closely the empirical method developed in Chetty and Hendren (2016). They estimate neighborhood effects on earnings, college attendance rates, and fertility and marriage rates by studying movers across commuting zones in the U.S. They find that the outcomes of children whose families move converge to those of permanent residents in the destination at a rate of approximately 4% per year.

[2] Several previous studies have used the placement policy to study the effects of living in different areas (e.g. Edin et al., 2003, on labor market outcomes; Åslund et al., 2011, on school performance; and Grönqvist et al., 2012, on income inequality and adult health).

variation between siblings in time spent in neighborhoods during childhood. To investigate if this result arises because there are no causal effects of neighborhoods on health, or because neighborhoods affect health instantly through contemporaneous environmental effects rather than through exposure time, I make use of the governmental policy that placed refugee families in their initial neighborhood. The results from the second empirical strategy confirm the findings in the first part of the paper. Together the results from the two parts imply that there are causal neighborhood effects on youth health, but these effects are instant and do not work through neighborhood exposure time.

Heckman (2007) provides a framework for thinking of how childhood environment effects the development of human capabilities. In the model, health is a function of parental capabilities (e.g. IQ, genes, and education), previous periods' health and investments. A key feature is that the process is dynamic, e.g. previous periods capabilities affect the ability to attain higher capabilities in the next periods. This is often referred to as developmental effects, which stand in contrast to contemporaneous, or situational, effects (Sampson, 2012). In this paper, health outcomes are measured using data on hospitalizations in adolescence. The main outcome is hospitalization related to any condition, but I also study three specific conditions, mental illness, accidents, and risky behavior, which has been shown to be relevant in the previous neighborhood effects literature. I find an effect on all these health measures from moving to an area with worse health outcomes, however I do not find any support for exposure time effects. The risk of accidents might be related to the neighborhood through the physical local environment, or through local cultural behavior. Along the same lines, risky behavior might also be affected by the immediate presence of peers. Hence, accidents and risky behavior among youths are likely to be more closely related to contemporaneous relations and immediate surroundings rather than previous exposure. For example, moving to a new neighborhood in which the new classmates drink alcohol more frequently, there is potentially an immediate effect on the likelihood on drinking alcohol that is unrelated to the time spent in the new neighborhood. Alcohol consumption and health are related, and it is possible that there are developmental effects, or neighborhood exposure time effects, but that these are long-term and hence not captured studying health among adolescents. Apart from acute conditions related to heavy drinking, severe damages from alcohol consumption take some time to develop and hence maybe we should not expect to find any neighborhood exposure time effects on health outcomes related to alcohol consumption among adolescents, but possibly we need to measure health outcomes 30-40 years later.

This paper relates to a large literature, primarily in sociology, that has documented a correlation between places and children's life chances (e.g. Jencks and Mayer, 1990; Brooks-Gunn et al., 1993; and Haveman and Wolfe, 1995). Fewer studies have examined how neighborhoods are related to child and adolescent health (for reviews, see Leventhal and Brooks-Gunn, 2000, and Sampson et al., 2002). However, the main part of the existing literature cannot claim to estimate causal effects of neighborhoods. What we know about causal effects of neighborhoods on youth health is mainly based on data from housing mobility programs in the U.S, primarily the Moving to Opportunity (MTO) program.[3]

MTO operated during the 1990s in five cities in the U.S: Baltimore, Boston, Chicago, Los Angeles and New York. Interested families from high poverty census tracts were randomly assigned to an experimental group, a comparison group, or a control group. The experimental group received a voucher to live in a low poverty area and obtained counseling assistance. The comparison group received an unrestricted voucher and the control group did not get any additional assistance.[4] Katz et al. (2001) examine the short-run effects of MTO and they find lower prevalence of injuries and asthma attacks among children and fewer behavioral problems among boys, however no statistically significant effects for girls.[5] The interim study by Kling et al. (2007) documents positive effects on female youths, who experienced improved mental health and less risky behavior. However, in contrast with Katz et al. (2001), they find that the intervention had negative effects on boys, who experienced increased physical health problems and more risky behavior. Ludwig et al. (2013) study the long-term effects among the MTO participants

[3] There are a couple of studies on neighborhoods and mortality among youth. Votruba and Kling (2009) find substantial reductions in mortality among young black males from taking part in the Gautreaux housing program in Chicago. The effects were mainly driven by large reductions in homicides. Jacob et al. (2013) study a housing voucher system in Chicago to which families were randomly assigned from a waiting list. Receiving a voucher decreased mortality rates for female children and youths, while the program did not have the same protective effect for males.

[4] Families were eligible for the MTO program if they had children and lived in public housing or assisted housing in a census tract with a poverty rate of 40 percent or more. Interested families with a complete application were selected from a waiting list and randomly assigned to an experimental group, a comparison group, or a control group (Katz et al., 2001).

[5] Katz et al. (2001) did not find any effects on earnings and employment from MTO. Neither did Kling et al. (2007) or Ludwig et al. (2013). The first to find effects in economic outcomes in the MTO program were Chetty et al. (2016) who focused on neighborhood exposure time and that found positive effects on children's income and college attendance among those moving before age 13. They did not have any data on health outcomes.

10-15 years after the intervention, and in line with the interim work they found positive effects on female youth's physical and mental health, while the results for males show that they did not benefit from moving.[6]

The experimental features of the MTO program have offered valuable insights of the causal effects of neighborhoods on health. However, by construction, the MTO studies are based on rather small and selective samples.[7] The first contribution of this paper is the use of population data; in the first part the total sample consists of almost 900,000 children of which 140,463 move once during childhood. In the MTO studies all families are initially living in very distressed areas and move to significantly better neighborhoods, which raise the question of generalizability (Sampson, 2008). An advantage of the first part of this paper is that I estimate the effect of neighborhoods from movers across all areas in Sweden. Hence, the estimated neighborhood effects come from variation of all types of neighborhoods and families. Furthermore, estimating neighborhood effects from all types of families allow me to consider that neighborhoods might differentially affect children's health depending on parental income. This might potentially be important as previous research has shown a strong relationship between parental income and children's health (e.g. Case et al., 2002, and Mörk et al., 2014).

The second main contribution of this paper is that I study the convergence in health outcomes. Previous research has focused on the effect of moving to more affluent areas, while in both parts of this paper I study how health outcomes in neighborhoods affects health of those moving in. By studying the convergence of health status, I am able to more directly test the hypothesis of neighborhood effects without a priori taking a stand on what characteristics in a neighborhood that is important. The third main contribution of this paper to the literature on neighborhoods and health is the use of register data on hospitalizations to measure youth health.[8] The Swedish setting is particularly suitable because health care is free for all children, which likely limits the problem of different

[6] Ludwig et al. (2013) also found positive effects of moving on adult health: lower BMI, psychological distress, and diabetes. This is in line with the findings in Katz et al. (2001), showing that families in the program experienced increased safety when moving, and adults' general and mental health improved, and Kling et al. (2007) showing that the MTO program had positive effects on adult mental health.

[7] Katz et al. (2001) have a sample of 612 children, Kling et al. (2007) have a sample of 749 (experimental) + 510 (Section 8) treated children, and Ludwig et al. (2013) have sample of 1,437 (experimental) + 1,031 (Section 8) treated children.

[8] The studies of the MTO program use self-reported health status. The main concern with self-reported health is that it depends on social experience, i.e. so-called reporting heterogeneity that could cause bias (Sen, 2002). This could be particularly problematic in studies of neighborhood effects if reporting bias is correlated with residential area. Another concern is attrition, which also might introduce bias.

health care seeking behavior across groups. Furthermore, I make use of In-patient data which further limit the problem of different health seeking behavior, as it only records over-night stays that requires relatively poor health.

The rest of the paper is structured as follows: The data is described in Section 2, Section 3 presents the empirical specification and results for the first empirical strategy using families that move across the country, in Section 4, the placement policy, empirical specification and results for the second part of the paper is presented. Lastly, Section 5 concludes.

## 2 Data

The data used for the analysis come from merging several national administrative registers for children born 1984-1992 and their parents. Family links are identified through the Multigenerational Register (see Statistics Sweden, 2013), which contains a personal identifier of children and parents. Neighborhoods are defined as municipalities; a municipality is the smallest administrative unit in Sweden holding elections and collecting taxes. Schools and kindergartens are also administered at municipal level making it suitable for studying children's development. There are 290 Swedish municipalities, which on average had 32,500 inhabitants year 2010.[9]

Data on place of residence is available from year 1985 onwards. Children's location cannot be directly observed in the data, but parental residential location is observed and it is reasonable to assume that the children in this sample live with their parents. If parents are living in different areas I assume that the child lives with her mother. If information on mother is missing (very few are) because of death or because she has emigrated, I use the father's location. Family income is defined as the sum of parent's earnings averaged over age 2-15 of the child, and then ranked by child cohort in the national distribution.[10]

The Swedish setting offers high qualitative health measures by administrative hospitalizations records. Health outcomes are measured for ages 16-19 and data come from the In-patient register. Health care is free for all children in Sweden, which likely limits the problem of different health care seeking behavior across groups. Furthermore, the use of In-patient data further limits the problem of different health seeking behavior, as it only records over-night stays which requires relatively poor health. The limitation using administrative data for measuring health is that I will not be able to differentiate between health outcomes below the threshold of seeking health care. The main measure of overall health is hospitalization for any cause. Following the previous literature, I look closer at hospitalizations due to mental problems, accidents, and risky behavior, which is

[9] It is possible that by defining a neighborhood to be this relatively large geographical unit I am not capturing the variation that exits within municipalities. However, in terms of estimation it is of importance that there are enough observations in each cell to be able to measure the quality of each neighborhood without too much noise. In relation to previous studies on neighborhood effects Swedish municipalities are relatively narrow, for example Chetty and Hendren (2016) use commuting zones (CZ) as their primary measure (average population about 430,000), and Bertrand et al. (2000) are using Public Use MicrodataArea (PUMA) (average population about 160,000) and the Metropolitan Statistical Area (MSA) (average population about 1,000,000).

[10] Mothers' age at birth is 28 on average and fathers is 31 for children in this sample. Measuring parental income over a 13-year period when the child is age 2-15 is therefore likely to be a good proxy for lifetime earnings (Haider and Solon, 2006).

defined as any hospitalization related to alcohol consumption, addiction, self-harm or teenage pregnancy.[11] Since only women are hospitalized for pregnancies, boys that become teenage fathers are identified from the Multi-generational register. Health outcomes are coded as dummy variables that equals 1 if hospitalized at least once during ages 16-19, and 0 otherwise. Table A1, in Appendix, relates the different diagnoses to specific ICD-codes.

There are significant differences in the share of hospitalized youth across the country: the mean hospitalization rates range from 0.216 in Orsa (Dalarna county) to 0.93 in Olofström (Blekinge county). Figure 1, left panel, shows that the general pattern is that hospitalization rates are higher in the northern part of the country and also in an area in the south east. The right panel in Figure 1 shows the gradient in hospitalization rates, that is the relationship between parents' percentile income rank and child hospitalization. Darker areas in the figure represent a steeper gradient. The slope of the gradient varies substantially across the country, ranging from 0.20 to negative numbers; in 12 percent of the municipalities children in richer families have higher risk of being hospitalized than children in poorer families. The steepest slope is found in Bjurholm (Västerbotten county); a move from the 25th percentile to the 75th percentile income rank is associated with 8.5 percent decrease in hospitalization rate. A comparison between the left and right panel in Figure 1 reveals that there is not a strong correspondence between areas with high levels of hospitalizations and areas with a steep gradient. Thus, a neighborhood might treat children growing up there very differently depending on parental income. For example, a neighborhood where children on average fare well might be a bad place for poor children to grow up if all health-promoting activities are expensive, or if all housing available to low income families are located next to a highway.

[11] Previous studies also look at asthma and mortality. I do not study these health outcomes since hospitalizations related to asthma and youth mortality are very are among in Sweden.

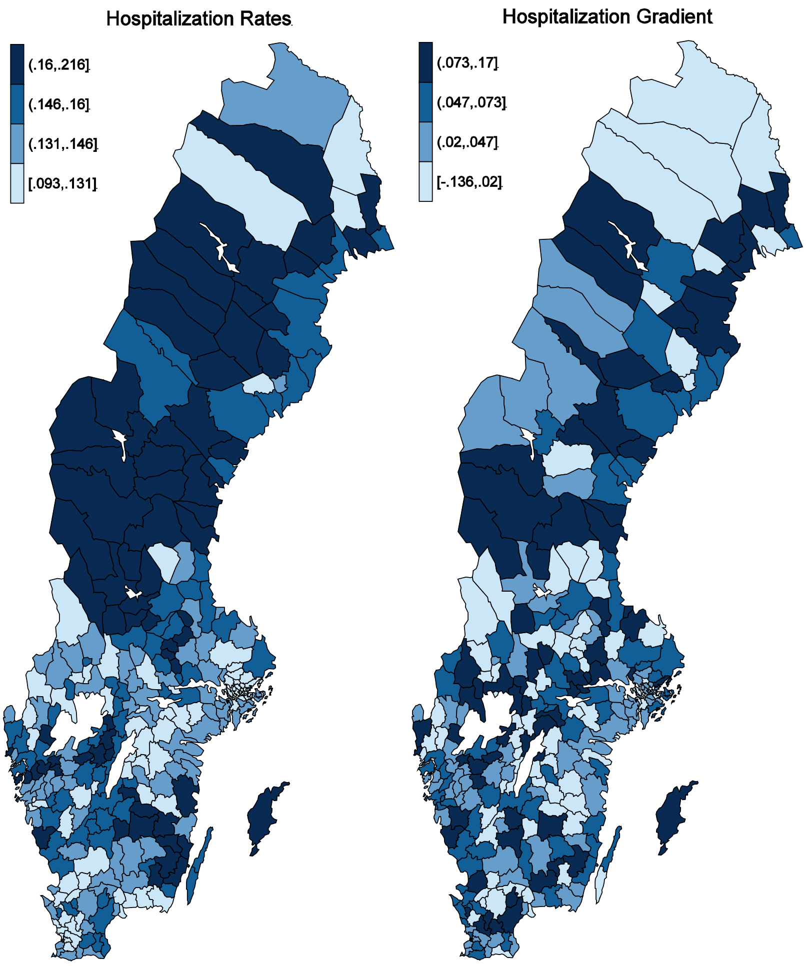


Figure 1 Hospitalization rates and health gradients across municipalities in Sweden

Notes: The left panel displays the share of hospitalized youth in each municipality among permanent residents. Darker areas represent higher share of hospitalized children. The right panel shows the slope of the gradient. Children in families with low income ranks generally have higher rates of hospitalizations than children in families with higher income rank. Darker areas are areas with steeper slope, i.e. the difference in hospitalization rates among poor children and rich children is larger. Both figures include controls for gender and birth cohort.

Figure A1 in Appendix, shows the relationship between parental income and youth health by child gender. The graphs show that the gradient for any hospitalization is rather linear, youth in the top decile has a hospitalization rate of 0.12, while youth in the bottom decile has a hospitalization rate of 0.18. The gradient is also pronounced for mental conditions and risky behavior in the bottom half of the income distribution, but flattens out in the top half. Females have higher overall hospitalization rates than males, and they are more likely to be hospitalized for mental conditions and risky behavior. Males on the other hand have a higher hospitalization rate related to accidents. This pattern confirms that it is important to consider gender differences when studying neighborhood effects on health. Figure A2 in Appendix, shows that there is no strong time trend in hospitalizations; mean hospitalization rate is constant at 0.15 across birth cohorts.

## 3 Movers across Neighborhoods

The main research question in this paper is whether children moving to neighborhoods where children have worse health outcomes in adolescence, will experience deteriorated health themselves. In this section I will describe movers within Sweden, the empirical method applied to estimate the effect of neighborhoods on health using movers, and lastly the results.

### 3.1 Movers

Tabell 1 summarizes the main variables used in the analysis by moving status. Movers are evenly distributed across birth cohorts, and there is no clear difference in mean health outcomes of children. If anything, movers have slightly higher risk of being hospitalized for mental illness and risky behavior. Movers have parents that on average have lower income rank but also somewhat higher education. This could be explained by the difference in parental birth cohorts, movers' parents are on average almost a year younger. Children that move also have higher risk of having parents that have separated or being non-employed at some point in during childhood.[12] This could very well reflect the reasons for moving and could have an independent effect on the health outcomes of children. Hence, it might be important to include yearly controls for parental separation, employment and income in the analysis. [13]

[12] These are some of the strongest predictors for moving (see Mincer, 1978, on families moving decisions, and Heidrich, 2016, for a later discussion on the Swedish case).

[13] An individual is defined as employed if he performed at least one hour of paid work per week in November, otherwise he is defined as non-employed in that year. From 1990 and onwards there exist a variable that identifies families living together in the same housing property. Unmarried couples living together with a common child is also defined as a family. I define parents as separated in a year if they do not have the same family identifying number, for years 1985-1989 I use 1990's status. Family income is defined as the sum of biological parents earnings averaged over age 2-15 of the child, and then ranked by child cohort in the national distribution. Earnings are deflated by the Swedish Consumer Price Index, base year 2007.

Tabell 1 Summary statistics: Individual characteristics of permanent residents and movers

| | Permanent | | Movers | |
|---|---|---|---|---|
| | Mean | S.D. | Mean | S.D. |
| Female | 0.48 | (0.50) | 0.49 | (0.50) |
| Year of birth, child | 1988.25 | (2.55) | 1988.24 | (2.56) |
| Percentile rank income, parents | 52.56 | (27.65) | 48.80 | (30.80) |
| Years of schooling, father | 11.67 | (2.28) | 12.08 | (2.49) |
| Years of schooling, mother | 12.17 | (2.20) | 12.39 | (2.32) |
| Separated, parents | 0.33 | (0.47) | 0.54 | (0.50) |
| Unemployed, father | 0.35 | (0.48) | 0.47 | (0.50) |
| Year of birth, mother | 1959.40 | (5.60) | 1960.18 | (5.64) |
| Year of birth, father | 1956.53 | (6.41) | 1957.22 | (6.56) |
| Hospitalized | 0.14 | (0.35) | 0.15 | (0.36) |
| Mental illness | 0.02 | (0.15) | 0.03 | (0.17) |
| Accidents | 0.03 | (0.17) | 0.03 | (0.18) |
| Risky behavior | 0.03 | (0.16) | 0.04 | (0.19) |
| Observations | | 729,748 | | 140,463 |

Who are the families moving across neighborhoods in Sweden? Overall, about 23 percent of the children move at least once during ages 1-15.[14] Children in the lower part of the income distribution are overrepresented among movers, but children in the top of income distribution are also relatively frequent movers. Among movers, the large share only move once, however children in the lowest part of income distribution are overrepresented among more frequent movers. Table A2a in Appendix characterizes moves by parent income quintile. Table A2b displays the moving pattern among one-time movers that are used in the analyses. A child is identified as a mover at age 2 if her parents moved between the year of the child's first birth day and the forthcoming year. The share of moves is rather evenly distributed across childhood, however most children move in early ages. This is likely due to the fact that parents with young children are on average younger and hence more inclined to move. The relatively large share of movers, and their representative characteristics, ensures high external validity of the results. Figure 1 shows that there is significant variation in health outcomes across the country. Figure 2 displays the distribution of change in neighborhood health outcomes when moving. For 40.6 percent of the children, health outcomes in destination area differ by more than one standard deviation from health outcomes in origin area.

[14] Chetty and Hendren (2016) show that 21 percent of children move at least once across commuting zones in their population wide data over the sample period (1996-2012).

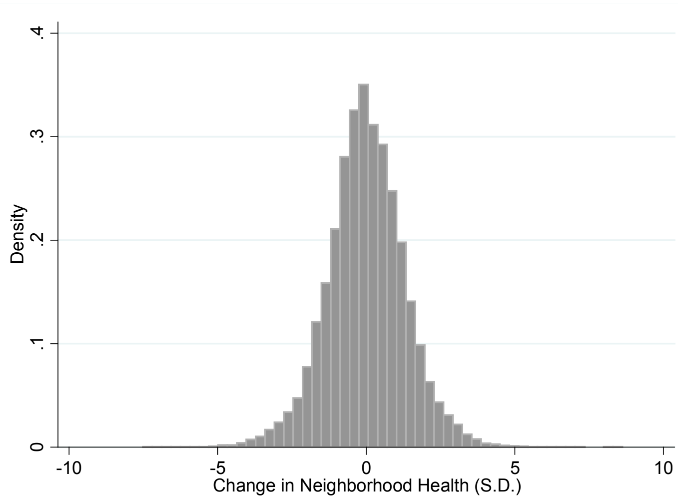


Figure 2 The distribution of change in neighborhood health (S.D.) when moving

## 3.2 Empirical Method

The quality of a neighborhood is defined by the health outcomes at ages 16-19 of the permanent residents, which are defined as those not moving during childhood (ages 1-15). I am estimating the following model on the sample of movers:

$$h_i = \alpha_{oc} + \beta \overline{h}_{dc} + \gamma \boldsymbol{X}_i + \varepsilon_i,$$

where $h_i$ is health outcome for individual $i$, $\alpha_{oc}$ is a fixed effect for the origin municipality by birth cohort $c$, $\overline{h}_{dc}$ is the health outcomes among permanent residents in the destination area $d$, among children born in cohort $c$ (standardized with mean 0 and standard deviation 1). $\boldsymbol{X}_i$ includes indicators for child gender and birth order since we know from previous research that these factors are strong predictors of child health (Mörk et al., 2014, and Björkegren and Svaleryd, 2017). The health care system is organized at the county level in Sweden. Therefore, $\boldsymbol{X}_i$ also includes county fixed effects to be able to hold constant any differences in hospitalization rates due to organizational differences across areas.[15] For this model to capture causal effects of neighborhoods on health there cannot be any selection on destination area linked to individual health given origin, child cohort and gender. This is a strong assumption and the estimates from this model should therefore be interpreted with caution.

[15] A drawback of including county fixed effects is that they might also absorb some of the potential neighborhood mechanisms. For example, access to sports activities or closeness to emitting industries might be correlated within counties. However, to be able to accurately compare hospitalization rates across areas, county fixed effects are needed.

As previous studies have shown, parental income is an important predictor of child health. The gradient also has different slopes across areas in Sweden (see Figure 1). Therefore, I test whether children converge to their peers in the same part of the parental income distribution. Another reason for considering parental income is that income might capture housing area and hence a narrower neighborhood. Family income is measured as the sum of biological parents' earnings and then averaged over childhood, ages 2-15. 16 The estimated model can now be written as:

$$h_i = \alpha_{qoc} + \beta \overline{h}_{qdc} + \gamma \boldsymbol{X}_i + \varepsilon_i,$$

where $\alpha_{qoc}$ is a fixed effect for origin $o$, by birth cohort $c$, by parental income quintile $q$, and $\overline{h}_{qdc}$ is the health outcomes among permanent residents in the destination area $d$, among children born in cohort $c$, with parents in income quintile $q$.

Previous studies have found that neighborhood effects increase linearly with exposure time for adult outcomes such as collage attendance, earnings, and marriage (Chetty and Hendren, 2016). To test if neighborhood exposure time matter for youth health, neighborhood quality is interacted with age at move, $M_i$[17]:

$$h_i = \alpha_{qocm} + \beta_1 \overline{h}_{qdc} + \beta_2 M_i \overline{h}_{qdc} + \gamma \boldsymbol{X}_i + \varepsilon_i,$$

where the fixed effect $\alpha_{qocm}$ now captures origin $o$, by birth cohort $c$, by parental income quintile $q$, by moving age $m$. This model estimates causal effects of neighborhoods under the assumption that selection effects do not vary with the child's age when moving. This assumption might be invalidated if families moving late are different from families moving with young children; parents moving with children in different ages might for example invest differently in their children and that could have an independent effect on youth health outcomes. Family fixed effects are added in the model to control for unobserved difference between families. The model then uses the variation between siblings in the exposure time for different neighborhoods. Adding family fixed effects does not solve the problem of other time-varying factors such as changes in family income that could change when moving and have an independent effect on youth health outcomes. Therefore, I add controls for yearly family income during childhood, as well as father employment status and an indicator of parental separation for each year.

[16] Income is deflated to be comparable over time (2007 years level).

[17] Age at move is linearly interacted with health in destination and is defined as 16 minus age at move. Effectively the interaction will estimate exposure time to new neighborhood. Exposure time is also tested in a more flexible specification using indicators of grouped age at move.

The models presented above are computationally burdensome to estimate due to the large number of fixed effects. Therefore, as a baseline model I estimate a model that control parametrically for the main part of the fixed effects.[18] The estimated neighborhood effects come from estimating the difference in the quality of the origin and destination area, controlling for the outcomes in the origin area, in the following model:

$$h_i = \sum_{s=1984}^{1992} I(c_i = c)(\alpha_c^1 + \alpha_c^2 \bar{h}_{oc}) + \beta\Delta_{odc} + \gamma\boldsymbol{X}_i + \varepsilon_i,$$

where $I(c_i = c)$ is an indicator function that is equal to one when $c_i = c$ and 0 otherwise, $\alpha_c^1$ is a cohort fixed effect and $\bar{h}_{oc}$ captures health outcomes among permanent residents in origin neighborhood and can vary over cohorts as it is interacted with cohort indicators. The second term, $\Delta_{odc}$, is the neighborhood effect of interest, and the third term, $\boldsymbol{X}_i$, controls for gender, birth order, and county as before. As previously, the effect is also allowed to vary with parental income. This gives us the following specification:

$$h_i = \sum_{c=1984}^{1992} I(c_i = c)(\alpha_c^1 + \alpha_c^2 \bar{h}_{qoc}) + \alpha^3 p_i + \beta\Delta_{qodc} + \gamma\boldsymbol{X}_i + \varepsilon_i,$$

where the second term captures parental income rank, $p_i$ and health in both origin and destination area are income quintile rank specific.[19] As in previous model I want to test whether being exposed longer to a neighborhood matters. Therefore, I add exposure time to the model:

$$h_i = \sum_{c=1984}^{1992} I(c_i = c)\big(\alpha_c^1 + \alpha_c^2 \bar{h}_{qoc}\big) + \sum_{m=2}^{15} I(m_i = m)(\alpha_m^1 + \alpha_m^2 p_i) + \beta_1\Delta_{qodc} + \beta_2 M_i\Delta_{qodc} + \gamma\boldsymbol{X}_i + \varepsilon_i,$$

where the first term controls for cohort and origin, the second term now contains indicators of moving age and allows this effect to vary with parental income rank, $p_i$. The third term capture the main effect of neighborhood health and the fourth term captures the exposure time effect of interest.[20] To the exposure time models I also add family fixed effects and time varying controls for parental income, separation and unemployment.

[18] As later shown, the results are not sensitive to the choice of model.
[19] $p_i$ is percentile income rank. Ideally, I would like to control for percentile rank also in the fixed effects models, however this yields too many fixed effects when interacted with neighborhood, cohort and moving age.
[20] Here as before, $M_i$ is exposure time defined as 16 minus age at move.

## 3.3 Baseline Results

Children moving to a neighborhood where permanent residents have worse health outcomes will also experience deteriorated health themselves. Table 2 shows the baseline regression results for any hospitalization in column (1), hospitalizations related to mental conditions in column (2), accidents in column (3), and risky behavior in column (4). Holding constant health outcomes in origin, the results reveal that children moving to areas where children in their own birth cohort do worse, have an increased risk of being hospitalized. Moving to an area with one standard deviation higher hospitalization rates (any condition) increases the probability of being hospitalized in adolescence with 0.77 percentage points, which relative to the mean of the dependent variable corresponds to 5.0 percent. The analogous figure for hospitalizations related to mental health is 9.0 percent, for accidents 6.6 percent, and for risky behavior 9.2 percent relative to the mean.

Tabell 2 Association between neighborhood health (S.D.) and probability of being hospitalized

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Hosp | Mental | Accident | Risky |
| Δ Health | 0.0077*** | 0.0028*** | 0.0021*** | 0.0034*** |
| | (0.001) | (0.001) | (0.001) | (0.001) |
| Mean | 0.153 | 0.031 | 0.032 | 0.037 |
| Observations | 140,463 | 140,463 | 140,463 | 140,463 |
| N clusters | 53,961 | 53,961 | 53,961 | 53,961 |

*Notes:* Results from linear probability models. Each column represents one regression. All specifications include controls for health in origin by child cohort interacted with cohort indicators, indicators for cohort, birth order, county and gender. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort.
$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

To test whether the convergence in health increases with time spent in the neighborhood as a child, exposure time is included in the model. Tabell 3 presents results from the model where health in destination area is interacted with exposure time, defined as the number of years the child spent in the destination area up until age 16. Column (1) includes all children moving once, in column (2) the sample is restricted to children in families for which I observe at least two siblings, column (3) adds family fixed effects to control for unobserved heterogeneity between families, and column (4) adds time-varying controls for family income, parental separation and father unemployment. Overall, the results show no evidence of convergence in health related to time spent in a neighborhood during upbringing.

Tabell 3 Exposure time effects of neighborhood health (S.D.) and probability of being hospitalized

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | All | Siblings | Fam FE | Fam FE |
| ∆ Hosp*Exposure | -0.0001 | 0.0001 | -0.0002 | -0.0002 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| | [0.153] | [0.150] | [0.150] | [0.150] |
| ∆ Mental*Exposure | 0.0000 | -0.0000 | -0.0002 | -0.0002 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| | [0.031] | [0.031] | [0.031] | [0.031] |
| ∆ Accident*Exposure | 0.0001 | 0.0002 | -0.0001 | -0.0001 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| | [0.032] | [0.032] | [0.032] | [0.032] |
| ∆ Risky*Exposure | -0.0000 | -0.0002 | -0.0003 | -0.0003 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| | [0.037] | [0.037] | [0.037] | [0.037] |
| Time-varying controls | No | No | No | Yes |
| Observations | 140,463 | 59,496 | 59,496 | 59,496 |
| N clusters | 53,961 | 29,483 | 29,483 | 29,483 |

*Notes:* Results from linear probability models. Each cell represents one regression. All specifications include controls for health in origin by child cohort interacted with cohort indicators, differences in health between destination and origin, indicators for age at move, cohort, birth order, county and gender. Mean of dependent variables are shown in square brackets. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort. $^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

Given that family income is a strong predictor of child health, and because we know that there is a difference in the slope of the gradient between municipalities, it is potentially important to allow the effect to vary with parental income rank. The results are presented in the Appendix, Tables A3a-A3b. The estimate for hospitalization, any cause, is slightly weaker than the effects presented in Table 2, but still sizeable. The effect of moving to an area with one standard deviation higher hospitalization rates increases the risk of being hospitalized with 0.4 percentage points, which is 2.9 percent relative to the mean. For hospitalizations related to mental health and risky behavior, the estimates are very close to the estimates in Table 2. There are no statistically significant effects for accidents. Including exposure time effects, the results are in line with the results presented in Tabell 3, showing no evidence of exposure time effects.

### 3.4 Robustness

Tables A4-A5 in the Appendix present the results for the first model with all fixed effects. The results confirm that the parametric baseline model works very well and produces results that are close to the fixed effects models. Both the estimates for the overall association between places and health, and the exposure time effects, are almost identical to the baseline results showing sizeable correlations between neighborhoods and health, but no evidence of exposure time effects.

The exposure time effects models presented so far all are based on a linear model, if there is a constant effect of neighborhood exposure in childhood on youth health outcomes. This might be too restrictive if for example there are certain ages during childhood when a child is particularly susceptible to the neighborhood. Therefore, I create indicators for moving age and interact these with neighborhood health. The results are presented in Tables A6a-A6d for all outcomes, and these results confirm previous findings that there is no evidence of any neighborhood exposure time effects on health in adolescence.

### 3.5 Heterogeneous Effects

*Gender:* Previous research has shown that neighborhoods often have differential effects on female and male health (e.g. Kling et al., 2007, and Ludwig et al., 2013). Therefore, I estimate the baseline models separately by gender. Results are presented in the Appendix, Tables A7a-A7b show the effects for females, and Tables A8a-A8b present the results for males. The association between places and health is very similar across gender, taking the difference in sample mean of the dependent variable into account. Again, there is no evidence of any exposure time effects.

*Quality of neighborhoods:* It might be the case that neighborhoods do not matter for children's health outcomes if neighborhoods are good enough. To test this, I look closer at children in families that move to the neighborhoods with the poorest health outcomes. Places are ranked by the average health outcomes in respective category over all cohorts and income groups. The results in Tables A9a-A9b show small and insignificant neighborhood effects and no exposure time effects for children moving to the 50 worst places.

*Parental income:* I split the sample by parental income rank to test whether lower income children are more vulnerable to neighborhood conditions. Low income families are defined as families with parental income below the 20th percentile. Tables A10a-A10b show estimates that are generally in line with the baseline results for all children, which imply that in this sample of Swedish children, there is no support for the hypothesis that children born in families with lower income are more susceptible to the neighborhood.

*Foreign background:* We know from previous research that individuals with a foreign background on average have a lower socioeconomic status and hence might be more susceptible to the neighborhood influences. I define a child as having foreign background if both parents are born outside the Nordic countries. Tables A11a-A11b show no support for this hypothesis, however the sample size is very small.

### 3.6 Placebo Tests

In the first model, without exposure time effects, identification hinges on the assumption that there is no selection on destination area linked to individual health given origin, child cohort and gender. One way of testing this is if outcomes before moving are affecting later moving decisions. The rich data allow me to test this assumption directly. Health a birth, measured as hospitalizations related to perinatal and congenital malformations in the early period in life, ages 0-1, can be observed for cohorts born 1987-1992. Estimating the baseline specification without exposure time, where treatment is hospitalization (for any condition, mental illness, accidents, and risky behavior) ages 16-19 among permanent residents just as before, but individual outcomes in adolescence are replaced with health at birth, shows that there is little evidence of such selection. These results are shown in Tabell 4.

Tabell 4 Placebo test: Association between neighborhood health (S.D.) and health at birth

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Hosp | Mental | Accident | Risky |
| Δ Health | -0.0019* | -0.0017 | -0.0006 | -0.0001 |
| | (0.001) | (0.001) | (0.001) | (0.001) |
| Mean | 0.092 | 0.092 | 0.092 | 0.092 |
| Observations | 99,083 | 99,083 | 99,083 | 99,083 |
| N clusters | 36,826 | 36,826 | 36,826 | 36,826 |

*Notes:* Results from linear probability models. Each column represents one regression. All specifications include controls for health in origin by child cohort interacted with cohort indicators, indicators for cohort, birth order, county and gender. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The identifying assumption in the second model that explores neighborhood exposure time is that selection effects do not vary with the child's age when moving. To test this assumption, I run the baseline specification with health at birth on exposure time. If the assumption is valid, there should be no effect of future moving pattern on previous health. The results, shown in Tabell 5, show no evidence of selection that vary with child's age when moving (exposure time).

Tabell 5 Placebo test: Exposure time effects of neighborhood health (S.D.) and health at birth

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | All | Siblings | Fam FE | Fam FE |
| Δ Hosp*Exposure | -0.0000 | -0.0001 | -0.0001 | -0.0002 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| Δ Mental*Exposure | -0.0001 | 0.0003 | 0.0005 | 0.0005 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| Δ Accident*Exposure | -0.0000 | -0.0001 | -0.0006 | -0.0006 |
| | (0.000) | (0.000) | (0.001) | (0.001) |
| Δ Risky*Exposure | 0.0000 | 0.0002 | 0.0001 | 0.0001 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| Time-varying controls | No | No | No | Yes |
| Mean | 0.092 | 0.089 | 0.089 | 0.089 |
| Observations | 99,083 | 44,084 | 44,084 | 44,084 |
| N clusters | 36,826 | 21,154 | 21,154 | 21,154 |

*Notes:* Results from linear probability models. Each cell represents one regression. All specifications include controls for health in origin by child cohort interacted with cohort indicators, differences in health between destination and origin, indicators for age at move, cohort, birth order, county and gender. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

### 3.7 Discussion

The analysis in this section shows that there is a correlation between places and adolescent health. Children in families that move to places where permanent residents have worse health outcomes, have worse health in adolescence themselves. However, the analysis does not show any evidence of exposure time effects. This result could arise if there are causal effects of neighborhoods on youth health but these are contemporaneous and independent of exposure time. In the entire sample, only 1.7 percent move across municipalities at age 15, which suggests that almost all children stayed in their destination neighborhood during late adolescence when health outcomes are measured. The other plausible explanation is that the association between places and health is entirely driven by selection. In the next section of I will try to determine whether there are causal effects of neighborhoods on adolescent health, and if any potential effects are contemporaneous or if exposure time matter. To this end, I make use of a governmental policy that placed refugees in their initial neighborhood of residence. This policy provides potentially exogenous variation in neighborhood for refugee children arriving to Sweden in the late 1980's and early 1990's.

# 4 Quasi-experiment: Refugee Placement Policy

In this section I utilize a government policy that placed refugees in their initial neighborhood of residence to study neighborhood effects on child health. First, I present the refugee placement policy, then the data and empirical method is discussed, and lastly the results.

## 4.1 Refugee Placement Policy[21]

Sweden has a relatively large share of immigrant population, in 2015, 17 percent of the population of 9.9 million was foreign-born. During the 1970's, the previous labor immigrants were replaced with refugees and family reunification migrants. In the mid 1980's some municipalities were dissatisfied with the rise in the number of immigrants as they perceived this as a burden on the local budget. The government then gave the Immigration Board the task of assigning asylum seekers to suitable municipalities with the aim to speed up the integration process. Family reunification immigrants were exempted from the policy. In late 1980's the number of receiving municipalities increased from 60 to 277 of Sweden's then 284 municipalities.

When first arriving to Sweden, asylum seekers were placed in refugee centers while waiting for the residence permit decision. The refugee centers were placed all over Sweden and there was no correlation between port of entry and which center the asylum seeker were placed in. On average, the asylum seeker waited three to twelve months for residence permit. Thereafter, the refugee was assigned to the municipality where they had been given residence. Families were treated as a single unit, hence children moved with their parents to the new location. The aim of the policy was originally to place immigrants in neighborhoods where opportunities for finding a job and education were good. However, the Swedish housing market was booming at the same period which severely

[21] This part of the paper summarizes what is known about the refugee placement policy and is based primarily on the previous work by Edin et al. (2003) and Åslund et al. (2011).

limited the possibility to perform this task. In practice this implied that refugees were placed where housing could be found.

The placement officers never met the refugees in person, but the officers had some information on the refugees they were placing; they knew their age, education, gender, marital status, family size and country of origin. Hence, it is crucial to control for these individual characteristics in the regression.[22] It was possible for refugees to state their preferred municipality. In practice few did this and for those who did the possibility to fulfill their preference was very limited. This was because most of those who stated a location preference wanted to be placed in the largest urban areas in Sweden: Stockholm, Gothenburg or Malmö. However, the explicit goal of the policy was to reduce the inflow to these areas, and the booming housing market made it very difficult to find vacant housing in these areas. Furthermore, since placement was made soon after receiving a residence permit, the joint probability of finding a vacant housing in the preferred neighborhood and receiving a residence permit at the same time was very low. The refugees could move after the placement, but they were still required to take part in an 18-month introduction program in their assigned municipality to qualify for social assistance during the initial period. Figure A3 in Appendix shows the share of children still living in their assigned municipality by year. The figure shows that eight years after arrival, about 50 percent were still living in their assigned municipality.

Tabell 6 shows that the refugee children arriving in this period have much poorer parents on average, but the parents have on average only slightly lower education than permanent residents in Sweden. Almost all fathers have been non-employed/unemployed at least once during the observed period. The refugee children have somewhat lower risk of being hospitalized for any condition, even though differences are small.

[22] Unfortunately, there is no good way of checking for balance, i.e. to study whether the placement was random given the observed characteristics. This is because it does not exist any information in the administrative data available that was not available for the placement officers.

Tabell 6 Summary statistics: Individual characteristics of refugees and permanent residents

| | Refugees | | Permanent | |
|---|---|---|---|---|
| | Mean | S.D. | Mean | S.D. |
| Female | 0.48 | (0.50) | 0.49 | (0.50) |
| Year of birth, child | 1987.11 | (2.36) | 1988.24 | (2.56) |
| Percentile rank income, parents | 13.86 | (13.92) | 48.80 | (30.80) |
| Years of schooling, father | 11.12 | (2.71) | 12.08 | (2.49) |
| Years of schooling, mother | 10.56 | (2.56) | 12.39 | (2.32) |
| Separated, parents | 0.48 | (0.50) | 0.54 | (0.50) |
| Non-employed/Unemployed, father | 0.99 | (0.09) | 0.47 | (0.50) |
| Year of birth, mother | 1961.18 | (5.51) | 1960.18 | (5.64) |
| Year of birth, father | 1956.89 | (6.29) | 1957.22 | (6.56) |
| Hospitalized | 0.12 | (0.33) | 0.15 | (0.36) |
| Mental illness | 0.02 | (0.13) | 0.03 | (0.17) |
| Accidents | 0.02 | (0.15) | 0.03 | (0.18) |
| Risky behavior | 0.03 | (0.17) | 0.04 | (0.19) |
| Observations | | 35,754 | | 752,367 |

## 4.2 Empirical Method

The setting in which the policy took place is the main arguments why the policy provides plausibly exogenous variation in the initial location (see previous applications in e.g. Edin et al., 2003; Åslund et al., 2001; Grönqvist et al., 2012). However, as pointed out in Nekby and Pettersson-Lidbom (2017), the aggregated inflow of refugees is potentially correlated with unobserved municipality trends. However, for this study design I do not need to make any assumption about the correlation between the rate of inflow of refugees and potentially unobserved local characteristics (e.g. local political preferences).[23] The crucial assumption for a causal interpretation of the estimates is that families could not influence the placement, given the set of family characteristics known by the placement officer. Thus, it is important to control for all information given to the placement officers, luckily these variables are available in the administrate data. Unfortunately, it does not exist any published individual data on which were placed in the program. As previous studies, I must use an indirect approach of identifying which individuals were placed through the program by combining information of year of arrival and region of origin.[24]

[23] This issue is of greater importance when the policy is used for studying the effect on people already living in the designated municipalities, e.g. Dahlberg, Edmark and Lundqvist (2012) study the effect on voter preferences for redistribution of refugee inflow. In contrast, in this study I examine the effect of being placed in a neighborhood on the outcomes of the refugee children.

[24] Region of origins are specified in Appendix, Table A12. Unfortunately, exact country of origin is missing in the data for some regions. However, exact country of origin exists for immigrants arriving year 1985-1989. In Appendix, Tables A16a-A16b, results using the sample for which I observe exact country of origin is are presented. The results with country of origin fixed effects give very similar results as the model controlling for region of origin in the same sample.

Following closely the baseline empirical model in part one, I am estimating the following model on the sample of refugee children:

$$h_i = \alpha + \beta \overline{h}_{dc} + \delta \boldsymbol{X}_i + \gamma \boldsymbol{Z}_f + \varepsilon_i,$$

where $h_i$ is health outcome of individual $i$, $\overline{h}_{dc}$ is the health outcomes among permanent residents in destination area $d$, born in cohort $c$, $\boldsymbol{X}_i$ is a vector of individual characteristics including indicators of region of origin,[25] destination county[26], child cohort, gender, birth order and immigration year. $\boldsymbol{Z}_f$ is a vector of family characteristics including number of children, parental marital status, age at immigration and educational attainment.[27]

Furthermore, I utilize age at immigration among children to estimate a model with neighborhood exposure time.[28] I will also add family fixed effects in which the variation in exposure time between siblings is used to identify neighborhood effects.

[25] The region of origin fixed effects are likely to control for differential inclination to seek medical care as well as potential discriminatory behavior of the medial staff depending on ethnicity.

[26] Adding county fixed effects to the model controls for differences in the health care system across regions in Sweden. County fixed effects might also potentially solve a problem of the placement policy. As described, some refugees stated a preferred municipality. This wish was rarely met, however when it was met, these county fixed effects are likely to capture some of this effect as it controls for differences in preferences across places.

[27] Adopting the model from part one where neighborhood effects are allowed to vary with income, is more complicated in this context as the policy by definition placed children in specific neighborhoods. Hence, family income cannot be argued to be the deciding factor for residential location. Another problem is that newly arrived families have on average very low earnings and income might thus be a poor predictor of child health for these individuals. The refugees were in principle not allowed to work during the introductory program.

[28] Given the set of restrictions that is put on the data, i.e. that children should be born year 1984-1992 and immigrated year 1985-1994, children will be age 0-10 when arriving to Sweden. Outcomes are still measured age 16-19, and exposure time is defined as age 16 minus age at immigration.

## 4.3 Results

Tabell 7 shows that refugee children that were placed in neighborhoods where permanent residents, children in their own birth cohort, had one standard deviation worse health outcomes, will have a 0.38 percentage point increased risk of being hospitalized in adolescence. This corresponds to 3 percent relative to the sample mean. The corresponding figures for mental health is 7.3 percent, for accidents 7.0 percent, and for risky behavior 5.7 percent relative to the sample mean. The estimated magnitudes are in line with what was found in Section 3 for accidents, but 20 percent smaller for mental health, and about 40 percent smaller for hospitalizations for any condition and risky behavior.

Tabell 7 The effect of being placed in a neighborhood with one S.D. worse health on the probability of being hospitalized

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Hosp | Mental | Accidents | Risky |
| Health | 0.0038** | 0.0013* | 0.0016* | 0.0017* |
| | (0.002) | (0.001) | (0.001) | (0.001) |
| Mean | 0.121 | 0.018 | 0.023 | 0.030 |
| Observations | 35,754 | 35,754 | 35,754 | 35,754 |
| N clusters | 2,427 | 2,427 | 2,427 | 2,427 |

*Notes:* Results from linear probability models. Each column represents results from a separate regression. All specifications include indicators for region of origin, child cohort, child gender, birth order, year of immigration, parents' civil status, destination county, and controls for parental years of schooling, number of children, and parents' age at immigration. Standard errors are presented in parenthesis and clustered on destination by child cohort.
$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

As in Section 3, exposure time is added to the model to test whether longer exposure time to a neighborhood matters for health outcomes. Following the same structure, I also add family fixed effects that utilize differences in exposure time between siblings. Family fixed effects control for exact place of origin, but also local neighborhood and preferences and could hence be helpful in estimating neighborhood effects also in this setting. Table 8 displays the results from these regressions, which show no statistically significant effects of exposure time to neighborhood.

Tabell 8 Exposure time effects of neighborhood health (S.D.) and probability of being hospitalized

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | All | Siblings | Fam FE | Fam FE |
| Hosp.*Exposure | 0.0004 | 0.0006 | -0.0008 | -0.0007 |
| | (0.001) | (0.001) | (0.001) | (0.001) |
| | [0.121] | [0.125] | [0.125] | [0.125] |
| Mental*Exposure | 0.0001 | 0.0002 | 0.0008 | 0.0009 |
| | (0.000) | (0.000) | (0.001) | (0.001) |
| | [0.018] | [0.018] | [0.018] | [0.018] |
| Accident*Exposure | -0.0001 | 0.0000 | 0.0001 | 0.0001 |
| | (0.000) | (0.000) | (0.001) | (0.001) |
| | [0.023] | [0.024] | [0.024] | [0.024] |
| Risky*Exposure | 0.0002 | -0.0002 | -0.0003 | -0.0002 |
| | (0.000) | (0.000) | (0.001) | (0.001) |
| | [0.030] | [0.033] | [0.033] | [0.033] |
| Time-varying controls | No | No | No | Yes |
| Observations | 35,754 | 18,937 | 18,937 | 18,937 |
| N clusters | 2,427 | 2,275 | 2,275 | 2,275 |

*Notes:* Results from linear probability models. Each cell represents results from a separate regression. All specifications include indicators for region of origin, child cohort, child gender, birth order, parents' civil status, age at immigration, destination county, and controls for health in destination by cohort, parental years of schooling, number of children, and parents' age at immigration. Mean of dependent variables are shown in square brackets. Standard errors are clustered on destination by child cohort. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

## 4.4 Robustness

In Tabell 8, exposure time to neighborhood is introduced linearly. It is possible that the effect is non-linear and that the estimated model is too restrictive. The results from a more flexible specification using indicators for moving age are presented in Appendix, Table A13a-A13d. The results show that there is no significant difference in convergence in health outcomes between children immigrating before age 6, and children immigrating later (ages 6-10).

The placement policy was most strongly applied during years 1987-1991 (Edin et al., 2003). As a robustness check I limit the sample to those arriving to Sweden during that period. The results are found in Appendix, Table A14, and are very similar to the results for the entire period.

One limitation of the data is that country of origin is missing for some countries. Instead controls for region of origin are used in the main analysis for these places. However, data on exact country of birth exist for years 1985-1989. To check if the use of regions affects the findings, I compare results using controls for exact country of birth with the results using region for refugees arriving 1985-1989. The results are displayed in Table A15a-A15b. The two tables show almost identical estimates, which strongly suggest that using region of birth for some countries is not affecting the results.

### 4.5 Discussion

The results presented in this section show that refugee children that were initially placed in neighborhoods where permanent residents had worse health outcomes, were more likely to be hospitalized in adolescence. The estimated magnitudes are in line with what was found using movers across areas in Sweden for accidents, but 20 percent smaller for mental health, and about 40 percent smaller for hospitalizations for any condition and risky behavior. Furthermore, also in line with the previous results, there is no evidence of any exposure time effects.

## 5 Conclusion

The aim of this paper has been to estimate neighborhood effects on youth health. To answer the question of whether neighborhoods affect health outcomes I have applied two different empirical methods. The first method uses variation in neighborhood conditions from families that move across areas. The results from this part confirm the correlation between neighborhoods and youth health found in previous observational studies. The effects are ranging from 5-9 percent from moving to a neighborhood with one standard deviation higher hospitalization rates, depending on cause of hospitalization. To pin down any causal effects, differences in exposure time to neighborhoods are compared between siblings. The results from this exercise show no evidence of exposure time effects of neighborhoods. These conflicting results can arise because of two reasons: The first potential explanation is that there are no causal neighborhood effects on adolescent health and that the association between places and health is mainly driven by selection. A second reason could be that there are causal effects of neighborhoods on health, but these effects are contemporaneous, hence exposure time to neighborhoods in childhood does not matter.

To try to determine whether there are any causal effects of neighborhoods on adolescent health, the second part of the paper uses a placement policy that offers potential exogenous variation in initial neighborhood for refugees. The results confirm the results from the first part that there are sizeable neighborhood effects on health outcomes, but there is no significant effect of exposure to neighborhood. The effects of being placed in a neighborhood with a one standard deviation worse health on the risk of being hospitalized are ranging from 3-7 percent depending on condition, on average the estimates are 30 percent smaller than what was found in the first part using movers across neighborhoods.

The findings from the two parts together imply that neighborhoods affect health in adolescence, but that there are no exposure time effects. The main health outcome is hospitalization related to any condition in adolescence, but I also study three specific conditions, mental illness, accidents, and risky behavior. The results could depend on the age of the individuals when outcomes are studied, but could also depend on the conditions analyzed. The risk of accidents might be related to the neighborhood through the physical local environment, or through local cultural behavior. Along the same lines, risky behavior might also be affected by the immediate presence of peers. Hence, accidents and risky behavior among youth are likely to be more closely related to contemporaneous relations and immediate surroundings rather than previous exposure. It is possible that there exist exposure time effects on health for this group, but that the effects are not detectable already in adolescence.

The results are in line with the findings in Ludwig et al. (2013) that find smaller effects in a longer term follow up from MTO than the interim evaluation did. The neighborhood conditions between treatment and control groups in MTO decreased over time, and if contemporaneous conditions are more important for youth health than the developmental effect, this could explain the results. Further research is needed to gain more understanding on the developmental effects of neighborhoods and long run health outcomes.

## References


Aizer, A., & Currie, J. (2004). Networks or neighborhoods? Correlations in the use of publicly-funded maternity care in California. *Journal of public Economics*, *88*(12), 2573-2585.

Bertrand, M., Luttmer, E. F., & Mullainathan, S. (2000). Network effects and welfare cultures. *The Quarterly Journal of Economics*, *115*(3), 1019-1055.

Björkegren E. & Svaleryd H. (2017) Birth order and child health. (No 2017:3) Working paper series, Department of Economics, Uppsala University.

Brooks-Gunn, J., Duncan, G. J., Klebanov, P. K., & Sealand, N. (1993). Do neighborhoods influence child and adolescent development?. *American journal of sociology*, *99*(2), 353-395.

Card, D., & Giuliano, L. (2013). Peer effects and multiple equilibria in the risky behavior of friends. *Review of Economics and Statistics*, *95*(4), 1130-1149.

Case, A., Lubotsky, D., & Paxson, C. (2002). Economic status and health in childhood: The origins of the gradient. *The American Economic Review*, *92*(5), 1308-1334.

Chetty, R., & Hendren, N. (2016). *The impacts of neighborhoods on intergenerational mobility i: Childhood exposure effects* (No. w23001). National Bureau of Economic Research.

Chetty, R., Hendren, N., & Katz, L. F. (2016). The effects of exposure to better neighborhoods on children: New evidence from the Moving to Opportunity experiment. *The American Economic Review*, *106*(4), 855-902.

Dahlberg, M., Edmark, K., & Lundqvist, H. (2012). Ethnic diversity and preferences for redistribution. *Journal of Political Economy*, *120*(1), 41-76.

Damm, A. P., & Dustmann, C. (2014). Does growing up in a high crime neighborhood affect youth criminal behavior? *The American Economic Review*, *104*(6), 1806-1832.

Edin, P. A., Fredriksson, P., & Åslund, O. (2003). Ethnic enclaves and the economic success of immigrants—Evidence from a natural experiment. *The quarterly journal of economics*, *118*(1), 329-357.

Grönqvist, H., Johansson, P., & Niknami, S. (2012). Income inequality and health: Lessons from a refugee residential assignment program. *Journal of health economics*, *31*(4), 617-629.

Haider, S., & Solon, G. (2006). Life-cycle variation in the association between current and lifetime earnings. *The American Economic Review*, *96*(4), 1308-1320.

Haveman, R., & Wolfe, B. (1995). The determinants of children's attainments: A review of methods and findings. *Journal of economic literature*, *33*(4), 1829-1878.

Heckman, J. J. (2007). The economics, technology, and neuroscience of human capability formation. Proceedings of the national Academy of Sciences, 104(33), 13250-13255.

Heidrich, S. (2016). The Effect of Moving during Childhood on Long Run Income: Evidence from Swedish Register Data, Working paper

Jacob, B. A., Ludwig, J., & Miller, D. L. (2013). The effects of housing and neighborhood conditions on child mortality. *Journal of health economics*, *32*(1), 195-206.

Jencks, C., & Mayer, S. E. (1990). The social consequences of growing up in a poor neighborhood. *Inner-city poverty in the United States*, *111*, 186.

Katz, L. F., Kling, J. R., & Liebman, J. B. (2001). Moving to opportunity in Boston: Early results of a randomized mobility experiment. *The Quarterly Journal of Economics*, *116*(2), 607-654.

Kling, J. R., Liebman, J. B., & Katz, L. F. (2007). Experimental analysis of neighborhood effects. *Econometrica*, *75*(1), 83-119.

Kremer, M., & Levy, D. (2008). Peer effects and alcohol use among college students. *The Journal of Economic Perspectives*, *22*(3), 189-189.

Leventhal, T., & Brooks-Gunn, J. (2000). The neighborhoods they live in: the effects of neighborhood residence on child and adolescent outcomes. *Psychological bulletin*, *126*(2), 309–337.

Ludwig, J., Duncan, G. J., Gennetian, L. A., Katz, L. F., Kessler, R. C., Kling, J. R., & Sanbonmatsu, L. (2013). Long-term neighborhood effects on low-income families: Evidence from Moving to Opportunity. *The American Economic Review*, *103*(3), 226-231.

Mincer, J. (1978). Family migration decisions. *Journal of Political Economy*, *86*(5), 749-773.

Mörk, E., Sjögren, A., & Svaleryd, H. (2014). Hellre rik och frisk. *Om familjebakgrund och barns hälsa. Stockholm: SNS Förlag*.

Nekby, L., & Pettersson Lidbom, P. (2016). Revisiting the relationship between ethnic diversity and preferences for redistribution. *The Scandinavian Journal of Economics*.

OECD (2017). Understanding the socio-economic divide in Europe. *Paris: OECD.*

Sampson, R. J. (2008). Moving to Inequality: Neighborhood Effects and Experiments Meet Social Structure 1. *American Journal of Sociology*, *114*(1), 189-231.

Sampson, R. J. (2012). *Great American city: Chicago and the enduring neighborhood effect*. University of Chicago Press.

Sampson, R. J., Morenoff, J. D., & Gannon-Rowley, T. (2002). Assessing “neighborhood effects”: Social processes and new directions in research. *Annual review of sociology*, *28*(1), 443-478.

Sen A. (2002). Health: perception versus observation. *BMJ*, 324, 860-861.

Statistics Sweden (2013). The Multi-generation register 2012. A description of contents and quality, Population and Welfare Statistics 2013:1. Örebro: Statistics Sweden.

Statistics Sweden (2016). Life expectancy in Sweden 2011-2015. Demographic reports 2016:4. Örebro: Statistics Sweden

Votruba, M. E., & Kling, J. R. (2009). Effects of neighborhood characteristics on the mortality of black male youth: Evidence from Gautreaux, Chicago. *Social Science & Medicine*, *68*(5), 814-823.

World Health Organization. (2008). Closing the gap in a generation. *Geneva: WHO*.

Åslund, O., Edin, P. A., & Fredriksson, P. (2011). Peers, neighborhoods, and immigrant student achievement: Evidence from a placement policy. *American Economic Journal: Applied Economics*, *3*(2), 67-95.

# Appendix

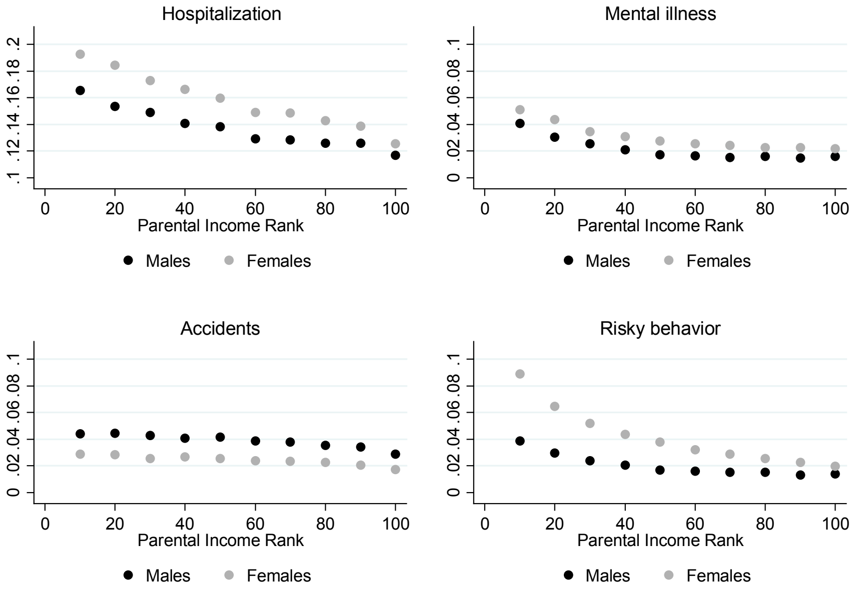


Figure A 1 Hospitalization and causes of hospitalization by gender and parental income deciles

*Notes:* The four figures show share of youth that has been hospitalized at least once ages 16-19 by gender and parental income decile. Note that hospitalizations (any cause) have a different level on the y-axis because mental illness, accidents and risky behavior are subsets of all hospitalizations.

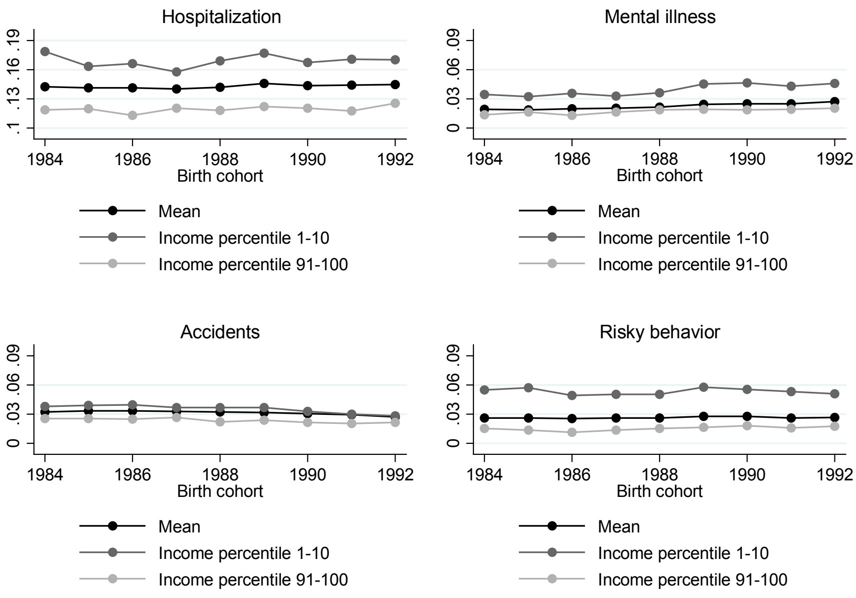


Figure A 2 Hospitalization and causes of hospitalization by birth cohort and parental income

*Notes:* The four figures show share of youth that has been hospitalized at least once ages 16-19 by birth cohort and parental income decile. Note that hospitalizations (any cause) have a different level on the y-axis because mental illness, accidents and risky behavior are subsets of all hospitalizations.

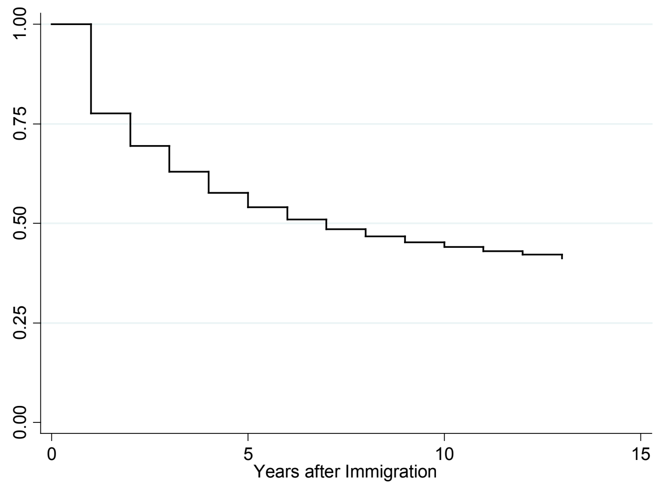


Figure A 3 Survival analysis: Share of refugee children in the initial neighborhood

*Notes:* The figure shows the share of refugee children that remained in the initial neighborhood years after immigration.

Table A 1 Diagnoses and ICD codes

| **Variable** | | **Definition** |
|---|---|---|
| Hospitalization (any cause) | | =1 if admitted to hospital with any condition |
| Mental health problems | | =1 if admitted to hospital with diagnosis codes F00-F99 |
| Accidents | | =1 if admitted to hospital with diagnosis codes V01-Y59 |
| Risky behavior | Alcohol abuse | =1 if admitted to hospital with diagnosis codes T51, X45, X65, Y15, F10, K70, K85, K86.0–1 E24.4, G31.2, G62.1, G72.1, I42.6, K29.2, 035.4, |
| | Addiction | =1 if admitted to hospital with diagnosis codes T36-T49 |
| | Self-harm | =1 if admitted to hospital with diagnosis codes Intentional self-harm X60-X84, event of undetermined intent Y10-Y34 |
| | Pregnancy | = if admitted to hospital with diagnosis codes O00-O99 |
| Perinatal conditions and congenital malformations | | =1 if admitted to hospital with diagnosis codes P00-P96 and Q00-Q99 |

Table A 2a Share of children moving (percent) by number of moves by parent income quintile

| *Moves* | q1 | q2 | q3 | q4 | q5 | q1-q5 |
|---|---|---|---|---|---|---|
| 0 | 64.34 | 76.25 | 82.70 | 83.93 | 77.98 | 77.13 |
| 1 | 18.82 | 14.94 | 12.17 | 12.00 | 16.53 | 14.86 |
| 2 | 9.74 | 5.91 | 3.74 | 3.05 | 4.21 | 5.30 |
| 3 | 3.96 | 1.87 | 0.98 | 0.75 | 0.99 | 1.70 |
| 4 | 1.78 | 0.70 | 0.30 | 0.19 | 0.22 | 0.63 |
| 5 | 0.77 | 0.21 | 0.08 | 0.06 | 0.05 | 0.23 |
| ≥6 | 0.59 | 0.12 | 0.04 | 0.01 | 0.02 | 0.15 |
| Total | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

*Notes:* The table shows the share of children moving ages 1-15, by number of moves by parental income quintile. The last column summarizes the share of moves independent of parental income.

Table A 2b Age at move (among one-time movers)

| Age at move | Frequency | Percent |
|---|---|---|
| 2 | 22,513 | 16.03 |
| 3 | 17,909 | 12.75 |
| 4 | 15,079 | 10.74 |
| 5 | 12,422 | 8.84 |
| 6 | 10,922 | 7.78 |
| 7 | 9,178 | 6.53 |
| 8 | 7,069 | 5.03 |
| 9 | 6,840 | 4.87 |
| 10 | 6,811 | 4.85 |
| 11 | 6,297 | 4.48 |
| 12 | 6,288 | 4.48 |
| 13 | 6,428 | 4.58 |
| 14 | 6,080 | 4.33 |
| 15 | 6,627 | 4.72 |
| Total | 140,463 | 100.00 |

*Notes:* The table shows the share of children moving by age among one-time movers.

Table A 3a Association between neighborhood health (S.D.) and probability of being hospitalized, allowing for differences over parental income

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Hosp | Mental | Accident | Risky |
| Δ Health | 0.0045*** | 0.0026*** | 0.0004 | 0.0031*** |
| | (0.001) | (0.001) | (0.001) | (0.001) |
| Mean | 0.153 | 0.031 | 0.032 | 0.037 |
| Observations | 140,463 | 140,463 | 140,463 | 140,463 |
| N clusters | 82,502 | 82,502 | 82,502 | 82,502 |

*Notes:* Results from linear probability models. Each column represents one regression. All specifications include controls for health in origin by child cohort by parental income quintile interacted with cohort indicators, indicators for parental income percentile, cohort, birth order, county and gender. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort by parental income quintile. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A 3b Exposure time effects of neighborhood health (S.D.) and probability of being hospitalized, allowing for differences over parental income

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | All | Siblings | Fam FE | Fam FE |
| Δ Hosp*Exposure | -0.0000 | -0.0000 | -0.0002 | -0.0002 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| | [0.153] | [0.150] | [0.150] | [0.150] |
| Δ Mental*Exposure | -0.0000 | -0.0001 | -0.0003 | -0.0003 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| | [0.031] | [0.031] | [0.031] | [0.031] |
| Δ Accidents*Exposure | 0.0001 | 0.0001 | -0.0001 | -0.0001 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| | [0.032] | [0.032] | [0.032] | [0.032] |
| Δ Risky*Exposure | -0.0000 | -0.0001 | -0.0002 | -0.0002 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| | [0.037] | [0.037] | [0.037] | [0.037] |
| Time-varying controls | No | No | No | Yes |
| Observations | 140,463 | 59,496 | 59,496 | 59,496 |
| N clusters | 82,502 | 41,376 | 41,376 | 41,376 |

*Notes:* Results from linear probability models. Each cell represents one regression. All specifications include controls for health in origin by child cohort by parental income quintile interacted with cohort indicators, difference in health between destination and origin, indicators for parental income percentile interacted with age at move, indicators for age at move, child cohort, birth order, county and gender. Mean of dependent variables are shown in square brackets. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort by parental income quintile. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A 4a Fixed effects models: Association between neighborhood health (S.D.) and probability of being hospitalized

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Hosp | Mental | Accident | Risky |
| Health | 0.0069*** | 0.0028*** | 0.0018*** | 0.0029*** |
| | (0.001) | (0.001) | (0.001) | (0.001) |
| Mean | 0.153 | 0.031 | 0.032 | 0.037 |
| Observations | 140,463 | 140,463 | 140,463 | 140,463 |
| N clusters | 53,961 | 53,961 | 53,961 | 53,961 |

*Notes:* Results from linear probability models. Each column represents one regression. All specifications include origin by child cohort fixed effects, indicators of child gender, birth order, and county. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A 4b Fixed effects models: Exposure time effects of neighborhood health (S.D.) and probability of being hospitalized

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | All | Siblings | Fam FE | Fam FE |
| Hosp*Exposure | -0.0001 | -0.0003 | -0.0006 | -0.0007 |
| | (0.000) | (0.001) | (0.001) | (0.001) |
| | [0.153] | [0.150] | [0.150] | [0.150] |
| | | | | |
| Mental*Exposure | 0.0000 | -0.0005 | 0.0000 | 0.0000 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| | [0.031] | [0.031] | [0.031] | [0.031] |
| | | | | |
| Accident*Exposure | 0.0004** | 0.0002 | -0.0003 | -0.0003 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| | [0.032] | [0.032] | [0.032] | [0.032] |
| | | | | |
| Risky*Exposure | -0.0000 | -0.0002 | -0.0001 | -0.0002 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| | [0.037] | [0.037] | [0.037] | [0.037] |
| | | | | |
| Time-varying controls | No | No | No | Yes |
| Observations | 140,463 | 59,496 | 59,496 | 59,496 |
| N clusters | 53,961 | 29,483 | 29,483 | 29,483 |

*Notes:* Results from linear probability models. Each cell represents results from one regression. All specifications include origin by child cohort by child moving age fixed effects, indicators of child gender, birth order, and county, and controls for health in destination by child cohort. Mean of dependent variables are shown in square brackets. Standard errors are clustered on origin by destination by child cohort. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A 5a Fixed effects models: Association between neighborhood health (S.D.) and probability of being hospitalized, allowing for differences over parental income

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Hosp | Mental | Accident | Risky |
| Health | 0.0041*** | 0.0022*** | -0.0000 | 0.0026*** |
| | (0.001) | (0.001) | (0.001) | (0.001) |
| Mean | 0.153 | 0.031 | 0.032 | 0.037 |
| Observations | 140,463 | 140,463 | 140,463 | 140,463 |
| N clusters | 82,502 | 82,502 | 82,502 | 82,502 |

*Notes:* Results from linear probability models. Each column represents one regression. All specifications include origin by child cohort by parental quintile fixed effects, indicators of child gender, birth order, and county. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort by parental income quintile.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A 5b Fixed effects models: Exposure time effects of neighborhood health (S.D.) and probability of being hospitalized, allowing for differences over parental income

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | All | Siblings | Fam FE | Fam FE |
| Hosp*Exposure | 0.0001 | 0.0013 | 0.0002 | 0.0002 |
| | (0.000) | (0.001) | (0.001) | (0.001) |
| | [0.153] | [0.150] | [0.150] | [0.150] |
| | | | | |
| Mental*Exposure | 0.0001 | -0.0003 | -0.0002 | -0.0002 |
| | (0.000) | (0.001) | (0.001) | (0.001) |
| | [0.031] | [0.031] | [0.031] | [0.031] |
| | | | | |
| Accident*Exposure | 0.0005** | 0.0001 | -0.0002 | -0.0002 |
| | (0.000) | (0.000) | (0.001) | (0.001) |
| | [0.032] | [0.032] | [0.032] | [0.032] |
| | | | | |
| Risky*Exposure | 0.0001 | 0.0007 | -0.0004 | -0.0004 |
| | (0.000) | (0.001) | (0.001) | (0.001) |
| | [0.037] | [0.037] | [0.037] | [0.037] |
| | | | | |
| Time-varying controls | No | No | No | Yes |
| Observations | 140,463 | 59,496 | 59,496 | 59,496 |
| N clusters | 82,502 | 41,376 | 41,376 | 41,376 |

*Notes:* Results from linear probability models. Each cell represents results from one regression. All specifications include origin by child cohort by parental income quintile by child moving age fixed effects, indicators of child gender, birth order, and county, and controls for health in destination by child cohort by parental income quintile. Mean of dependent variables are shown in square brackets. Standard errors are clustered on origin by destination by child cohort by parental quintile. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A 6a Exposure time effects of neighborhood health (S.D.) and probability of being hospitalized (any condition)

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | All | Siblings | Fam FE | Fam FE |
| Δ Health | 0.0088*** | 0.0103*** | 0.0071* | 0.0070* |
| | (0.002) | (0.003) | (0.004) | (0.004) |
| Δ Health* Move age <6 | -0.0015 | -0.0020 | -0.0044 | -0.0043 |
| | (0.002) | (0.003) | (0.004) | (0.004) |
| Δ Health* Move age 6-10 | -0.0018 | -0.0031 | -0.0066 | -0.0065 |
| | (0.002) | (0.003) | (0.004) | (0.004) |
| Move age <6 | -0.0155*** | -0.0122*** | -0.0129 | -0.0152* |
| | (0.003) | (0.004) | (0.009) | (0.009) |
| Move age 6-10 | -0.0059** | -0.0075* | -0.0051 | -0.0070 |
| | (0.003) | (0.004) | (0.007) | (0.007) |
| Time-varying controls | No | No | No | Yes |
| Mean | 0.153 | 0.150 | 0.150 | 0.150 |
| Observations | 140,463 | 59,496 | 59,496 | 59,496 |
| N clusters | 53,961 | 29,483 | 29,483 | 29,483 |

*Notes:* Results from linear probability models. Each column represents one regression. Omitted category is moving age 11-15. All specifications include controls for health in origin by child cohort interacted with cohort indicators, indicators for cohort, birth order, county and gender. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A 6b Exposure time effects of neighborhood health (S.D.) and probability of being hospitalized (mental conditions)

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | All | Siblings | Fam FE | Fam FE |
| Δ Health | 0.0023** | 0.0025* | 0.0033 | 0.0032 |
| | (0.001) | (0.001) | (0.002) | (0.002) |
| Δ Health* Move age <6 | 0.0003 | -0.0006 | -0.0020 | -0.0020 |
| | (0.001) | (0.002) | (0.002) | (0.002) |
| Δ Health* Move age 6-10 | 0.0015 | 0.0012 | -0.0010 | -0.0008 |
| | (0.001) | (0.002) | (0.002) | (0.002) |
| Move age <6 | -0.0093*** | -0.0079*** | -0.0122*** | -0.0130*** |
| | (0.001) | (0.002) | (0.004) | (0.004) |
| Move age 6-10 | -0.0048*** | -0.0046** | -0.0061* | -0.0066* |
| | (0.001) | (0.002) | (0.003) | (0.003) |
| Time-varying controls | No | No | No | Yes |
| Mean | 0.031 | 0.031 | 0.031 | 0.031 |
| Observations | 140,463 | 59,496 | 59,496 | 59,496 |
| N clusters | 53,961 | 29,483 | 29,483 | 29,483 |

*Notes:* Results from linear probability models. Each column represents one regression. Omitted category is moving age 11-15. All specifications include controls for health in origin by child cohort interacted with cohort indicators, indicators for cohort, birth order, county and gender. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort.* p < 0.10, ** p < 0.05, *** p < 0.01

Table A 6c Exposure time effects of neighborhood health (S.D.) and probability of being hospitalized (accidents)

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | All | Siblings | Fam FE | Fam FE |
| Δ Health | 0.0013 | -0.0005 | -0.0020 | -0.0022 |
| | (0.001) | (0.001) | (0.002) | (0.002) |
| Δ Health *Move age <6 | 0.0012 | 0.0020 | -0.0002 | -0.0000 |
| | (0.001) | (0.002) | (0.002) | (0.002) |
| Δ Health *Move age 6-10 | 0.0007 | 0.0020 | -0.0000 | 0.0001 |
| | (0.001) | (0.002) | (0.002) | (0.002) |
| Move age <6 | -0.0021* | -0.0013 | -0.0053 | -0.0074* |
| | (0.001) | (0.002) | (0.004) | (0.004) |
| Move age 6-10 | -0.0007 | -0.0023 | -0.0054 | -0.0067** |
| | (0.001) | (0.002) | (0.003) | (0.003) |
| Time-varying controls | No | No | No | Yes |
| Mean | 0.032 | 0.032 | 0.032 | 0.032 |
| Observations | 140,463 | 59,496 | 59,496 | 59,496 |
| N clusters | 53,961 | 29,483 | 29,483 | 29,483 |

*Notes:* Results from linear probability models. Each column represents one regression. Omitted category is moving age 11-15. All specifications include controls for health in origin by child cohort interacted with cohort indicators, indicators for cohort, birth order, county and gender. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A 6d Exposure time effects of neighborhood health (S.D.) and probability of being hospitalized (risky behavior)

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | All | Siblings | Fam FE | Fam FE |
| Δ Health | 0.0037*** | 0.0043*** | 0.0041* | 0.0041* |
| | (0.001) | (0.001) | (0.002) | (0.002) |
| Δ Health* Move age <6 | -0.0003 | -0.0015 | -0.0026 | -0.0027 |
| | (0.001) | (0.002) | (0.002) | (0.002) |
| Δ Health* Move age 6-10 | -0.0006 | -0.0004 | -0.0022 | -0.0023 |
| | (0.001) | (0.002) | (0.002) | (0.002) |
| Move age <6 | -0.0108*** | -0.0110*** | -0.0144*** | -0.0148*** |
| | (0.001) | (0.002) | (0.005) | (0.005) |
| Move age 6-10 | -0.0056*** | -0.0060*** | -0.0101*** | -0.0104*** |
| | (0.002) | (0.002) | (0.004) | (0.004) |
| Time-varying controls | No | No | No | Yes |
| Mean | 0.037 | 0.037 | 0.037 | 0.037 |
| Observations | 140,463 | 59,496 | 59,496 | 59,496 |
| N clusters | 53,961 | 29,483 | 29,483 | 29,483 |

*Notes:* Results from linear probability models. Each column represents one regression. Omitted category is moving age 11-15. All specifications include controls for health in origin by child cohort interacted with cohort indicators, indicators for cohort, birth order, county and gender. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A 7a Association between neighborhood health (S.D.) and probability of being hospitalized among females

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Hosp | Mental | Accident | Risky |
| Δ Health | 0.0099*** | 0.0035*** | 0.0018** | 0.0047*** |
| | (0.002) | (0.001) | (0.001) | (0.001) |
| Mean | 0.165 | 0.036 | 0.026 | 0.050 |
| Observations | 68,801 | 68,801 | 68,801 | 68,801 |
| N clusters | 33,017 | 33,017 | 33,017 | 33,017 |

*Notes:* Results from linear probability models. Each column represents one regression. All specifications include controls for health in origin by child cohort interacted with cohort indicators, indicators for cohort, birth order, county and gender. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A 7b Exposure time effects of neighborhood health (S.D.) and probability of being hospitalized among females

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | All | Siblings | Fam FE | Fam FE |
| Δ Hosp*Exposure | -0.0001 | -0.0007 | -0.0014 | -0.0013 |
| | (0.000) | (0.001) | (0.001) | (0.001) |
| | [0.165] | [0.158] | [0.158] | [0.158] |
| | | | | |
| Δ Mental*Exposure | 0.0002 | 0.0004 | 0.0002 | 0.0002 |
| | (0.000) | (0.000) | (0.000) | (0.001) |
| | [0.036] | [0.035] | [0.035] | [0.035] |
| | | | | |
| Δ Accident*Exposure | 0.0000 | -0.0004 | -0.0006 | -0.0005 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| | [0.026] | [0.025] | [0.025] | [0.025] |
| | | | | |
| Δ Risky*Exposure | 0.0001 | -0.0001 | -0.0002 | -0.0002 |
| | (0.000) | (0.000) | (0.001) | (0.001) |
| | [0.050] | [0.051] | [0.051] | [0.051] |
| Time-varying controls | No | No | No | Yes |
| Observations | 68,801 | 15,572 | 15,572 | 15,572 |
| N clusters | 33,017 | 10,446 | 10,446 | 10,446 |

*Notes:* Results from linear probability models. Each cell represents one regression. All specifications include controls for health in origin by child cohort interacted with cohort indicators, differences in health between destination and origin, indicators for age at move, cohort, birth order, county and gender. Mean of dependent variables are shown in square brackets. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A 8a Association between neighborhood health (S.D.) and probability of being hospitalized among males

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Hosp | Mental | Accident | Risky |
| Δ Health | 0.0055*** | 0.0022*** | 0.0025*** | 0.0022*** |
| | (0.001) | (0.001) | (0.001) | (0.001) |
| Mean | 0.141 | 0.026 | 0.038 | 0.024 |
| Observations | 71,662 | 71,662 | 71,662 | 71,662 |
| N clusters | 33,905 | 33,905 | 33,905 | 33,905 |

*Notes:* Results from linear probability models. Each column represents one regression. All specifications include controls for health in origin by child cohort interacted with cohort indicators, indicators for cohort, birth order, county and gender. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table A 8b Exposure time effects of neighborhood health (S.D.) and probability of being hospitalized among males

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | All | Siblings | Fam FE | Fam FE |
| Δ Hosp*Exposure | 0.0000 | 0.0001 | 0.0001 | 0.0002 |
| | (0.000) | (0.001) | (0.001) | (0.001) |
| | [0.141] | [0.137] | [0.137] | [0.137] |
| Δ Mental*Exposure | -0.0001 | -0.0002 | -0.0004 | -0.0005 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| | [0.026] | [0.024] | [0.024] | [0.024] |
| Δ Accident*Exposure | 0.0001 | 0.0004 | -0.0001 | -0.0001 |
| | (0.000) | (0.000) | (0.001) | (0.001) |
| | [0.038] | [0.037] | [0.037] | [0.037] |
| Δ Risky*Exposure | -0.0002 | -0.0003 | -0.0001 | -0.0001 |
| | (0.000) | (0.000) | (0.000) | (0.000) |
| | [0.024] | [0.024] | [0.024] | [0.024] |
| Time-varying controls | No | No | No | Yes |
| Observations | 71,662 | 17,040 | 17,040 | 17,040 |
| N clusters | 33,905 | 11,310 | 11,310 | 11,310 |

*Notes:* Results from linear probability models. Each cell represents one regression. All specifications include controls for health in origin by child cohort interacted with cohort indicators, differences in health between destination and origin, indicators for age at move, cohort, birth order, county and gender. Mean of dependent variables are shown in square brackets. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table A 9a Association between neighborhood health (S.D.) and probability of being hospitalized among children moving to the 50 neighborhoods with poorest health outcomes

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Hosp | Mental | Accident | Risky |
| Δ Health | 0.0024 | 0.0009 | 0.0003 | 0.0006 |
| | (0.003) | (0.002) | (0.001) | (0.002) |
| Mean | 0.131 | 0.023 | 0.025 | 0.029 |
| Observations | 23,681 | 16,424 | 37,690 | 19,777 |
| N clusters | 8,467 | 7,141 | 11,331 | 7,723 |

*Notes:* Results from linear probability models. Each column represents one regression. All specifications include controls for health in origin by child cohort interacted with cohort indicators, indicators for cohort, birth order, county and gender. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort.
$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

Table A 9b Exposure time effects of neighborhood health (S.D.) and probability of being hospitalized among children moving to the 50 neighborhoods with poorest health outcomes

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | All | Siblings | Fam FE | Fam FE |
| Δ Hosp*Exposure | -0.0005 | -0.0007 | -0.0011 | -0.0012 |
| | (0.000) | (0.001) | (0.001) | (0.001) |
| Mean | [0.131] | [0.128] | [0.128] | [0.128] |
| Observations | 23,681 | 10,020 | 10,020 | 10,020 |
| N clusters | 8,467 | 4,689 | 4,689 | 4,689 |
| | | | | |
| Δ Mental*Exposure | -0.0003 | -0.0004 | -0.0001 | -0.0001 |
| | (0.000) | (0.000) | (0.001) | (0.001) |
| Mean | [0.023] | [0.024] | [0.024] | [0.024] |
| Observations | 16,424 | 7,094 | 7,094 | 7,094 |
| N clusters | 7,141 | 3,906 | 3,906 | 3,906 |
| | | | | |
| Δ Accident*Exposure | 0.0001 | 0.0004 | -0.0002 | -0.0002 |
| | (0.000) | (0.000) | (0.001) | (0.001) |
| Mean | [0.025] | [0.024] | [0.024] | [0.024] |
| Observations | 37,690 | 15,326 | 15,326 | 15,326 |
| N clusters | 11,331 | 6,260 | 6,260 | 6,260 |
| | | | | |
| Δ Risky*Exposure | 0.0003 | 0.0002 | 0.0006 | 0.0004 |
| | (0.000) | (0.000) | (0.001) | (0.001) |
| Mean | [0.029] | [0.030] | [0.030] | [0.030] |
| Observations | 19,777 | 8,372 | 8,372 | 8,372 |
| N clusters | 7,723 | 4,200 | 4,200 | 4,200 |
| | | | | |
| Time-varying controls | No | No | No | Yes |

*Notes:* Results from linear probability models. Each cell represents one regression. All specifications include controls for health in origin by child cohort interacted with cohort indicators, differences in health between destination and origin, indicators for age at move, cohort, birth order, county and gender. Mean of dependent variables are shown in square brackets. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A 10a Association between neighborhood health (S.D.) and probability of being hospitalized among children with parental income <20 percentile

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Hosp | Mental | Accident | Risky |
| Δ Health | 0.0108*** | 0.0040*** | 0.0042*** | 0.0040*** |
| | (0.002) | (0.001) | (0.001) | (0.001) |
| Mean | 0.179 | 0.045 | 0.037 | 0.060 |
| Observations | 33,068 | 33,068 | 33,068 | 33,068 |
| N clusters | 20,328 | 20,328 | 20,328 | 20,328 |

*Notes:* Results from linear probability models. Each column represents one regression. All specifications include controls for health in origin by child cohort interacted with cohort indicators, indicators for cohort, birth order, county and gender. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A 10b Exposure time effects of neighborhood health (S.D.) and probability of being hospitalized among children with parental income <20 percentile

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | All | Siblings | Fam FE | Fam FE |
| Δ Hosp*Exposure | -0.0001 | 0.0000 | -0.0000 | -0.0000 |
| | (0.000) | (0.001) | (0.001) | (0.001) |
| | [0.179] | [0.178] | [0.178] | [0.178] |
| Δ Mental*Exposure | 0.0000 | 0.0000 | 0.0005 | 0.0004 |
| | (0.000) | (0.000) | (0.001) | (0.001) |
| | [0.045] | [0.043] | [0.043] | [0.043] |
| Δ Accident*Exposure | -0.0000 | 0.0004 | 0.0005 | 0.0005 |
| | (0.000) | (0.000) | (0.001) | (0.001) |
| | [0.037] | [0.036] | [0.036] | [0.036] |
| Δ Risky*Exposure | -0.0004 | -0.0004 | -0.0005 | -0.0006 |
| | (0.000) | (0.000) | (0.001) | (0.001) |
| | [0.060] | [0.061] | [0.061] | [0.061] |
| Time-varying controls | No | No | No | Yes |
| Observations | 33,068 | 13,589 | 13,589 | 13,589 |
| N clusters | 20,328 | 9,962 | 9,962 | 9,962 |

*Notes:* Results from linear probability models. Each cell represents one regression. All specifications include controls for health in origin by child cohort interacted with cohort indicators, differences in health between destination and origin, indicators for age at move, cohort, birth order, county and gender. Mean of dependent variables are shown in square brackets. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A 11a Association between neighborhood health (S.D.) and probability of being hospitalized among children with parents with foreign background

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Hosp | Mental | Accident | Risky |
| Δ Health | 0.0069 | 0.0027 | 0.0007 | 0.0035 |
| | (0.006) | (0.003) | (0.003) | (0.002) |
| Mean | 0.132 | 0.023 | 0.019 | 0.030 |
| Observations | 8,733 | 8,733 | 8,733 | 8,733 |
| N clusters | 5,439 | 5,439 | 5,439 | 5,439 |

*Notes:* Results from linear probability models. Each column represents one regression. All specifications include controls for health in origin by child cohort interacted with cohort indicators, indicators for cohort, birth order, county and gender. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A 11b Exposure time effects of neighborhood health (S.D.) and probability of being hospitalized among children with parents with foreign background

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | All | Siblings | Fam FE | Fam FE |
| Δ Hosp*Exposure | 0.0011 | 0.0003 | -0.0015 | -0.0017 |
| | (0.001) | (0.001) | (0.003) | (0.003) |
| | [0.132] | [0.122] | [0.122] | [0.122] |
| | | | | |
| Δ Mental*Exposure | -0.0002 | -0.0017** | -0.0008 | -0.0011 |
| | (0.000) | (0.001) | (0.001) | (0.001) |
| | [0.023] | [0.019] | [0.019] | [0.019] |
| | | | | |
| Δ Accident*Exposure | -0.0002 | -0.0001 | 0.0001 | 0.0001 |
| | (0.000) | (0.000) | (0.001) | (0.001) |
| | [0.019] | [0.015] | [0.015] | [0.015] |
| | | | | |
| Δ Risky*Exposure | 0.0001 | -0.0017** | -0.0014 | -0.0017* |
| | (0.000) | (0.001) | (0.001) | (0.001) |
| | [0.030] | [0.028] | [0.028] | [0.028] |
| Time-varying controls | No | No | No | Yes |
| Observations | 8,733 | 3,263 | 3,263 | 3,263 |
| N clusters | 5,439 | 2,228 | 2,228 | 2,228 |

*Notes:* Results from linear probability models. Each cell represents one regression. All specifications include controls for health in origin by child cohort interacted with cohort indicators, differences in health between destination and origin, indicators for age at move, cohort, birth order, county and gender. Mean of dependent variables are shown in square brackets. Standard errors are presented in parenthesis and clustered on origin by destination by child cohort.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table A 12 Region of birth, refugees

| Region of Birth | Percent of sample |
| --- | --- |
| 1. Former Yugoslavia | 40.61 |
| 2. Poland | 2.15 |
| 3. The Baltic states | 0.46 |
| 4. Eastern Europe 1 (Rumania, The former USSR, Bulgaria, Albania) | 4.46 |
| 5. Eastern Europe 2 (Hungary, The former Czechoslovakia) | 0.94 |
| 6. Mexico and Central America | 1.09 |
| 7. Chile | 3.26 |
| 8. Other South America | 1.67 |
| 9. African Horn (e.g., Ethiopia and Somalia) | 7.21 |
| 10. North Africa (Arabic countries: e.g., Morocco and Tunisia), Arabian Peninsula, and Middle East (e.g., Lebanon, Syria) | 10.51 |
| 11. Other Africa | 1.97 |
| 12. Iran | 10.01 |
| 13. Iraq | 7.30 |
| 14. Turkey | 2.99 |
| 15. South East Asia (e.g., Vietnam and Thailand) | 3.31 |
| 16. Other Asia (e.g., Sri Lanka, Bangladesh, and Afghanistan) | 2.07 |
| Total | 100 |

Table A 13a Exposure time effects of neighborhood health (S.D.) and probability of being hospitalized (any condition) among refugees

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | All | Siblings | Fam FE | Fam FE |
| Health | 0.0019 | 0.0019 | 0.0077 | 0.0079 |
| | (0.003) | (0.004) | (0.005) | (0.005) |
| Health*Immigration age<6 | 0.0028 | 0.0035 | -0.0003 | -0.0000 |
| | (0.003) | (0.005) | (0.006) | (0.006) |
| Immigration age<6 | -0.0090* | -0.0076 | -0.0049 | -0.0052 |
| | (0.005) | (0.007) | (0.011) | (0.012) |
| Time-varying controls | No | No | No | Yes |
| Mean | 0.121 | 0.125 | 0.125 | 0.125 |
| Observations | 35,754 | 18,937 | 18,937 | 18,937 |
| N clusters | 2,427 | 2,275 | 2,275 | 2,275 |

*Notes:* Results from linear probability models. Each column represents results from a separate regression. Omitted category is immigration age >5. All specifications include indicators for region of origin, child cohort, child gender, birth order, parents' civil status, destination county, and controls for parental years of schooling, number of children, and parents' age at immigration. Standard errors are clustered on destination by child cohort.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A 13b Exposure time effects of neighborhood health (S.D.) and probability of being hospitalized (mental conditions) among refugees

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | All | Siblings | Fam FE | Fam FE |
| Health | 0.0011 | -0.0009 | -0.0018 | -0.0019 |
| | (0.001) | (0.002) | (0.002) | (0.002) |
| Health*Immigration age<6 | 0.0004 | 0.0019 | 0.0038 | 0.0039 |
| | (0.002) | (0.002) | (0.003) | (0.003) |
| Immigration age<6 | -0.0037* | -0.0085*** | -0.0063 | -0.0073 |
| | (0.002) | (0.003) | (0.005) | (0.005) |
| Time-varying controls | No | No | No | Yes |
| Mean | 0.018 | 0.018 | 0.018 | 0.018 |
| Observations | 35,754 | 18,937 | 18,937 | 18,937 |
| N clusters | 2,427 | 2,275 | 2,275 | 2,275 |

*Notes:* Results from linear probability models. Each column represents results from a separate regression. Omitted category is immigration age >5. All specifications include indicators for region of origin, child cohort, child gender, birth order, parents' civil status, destination county, and controls for parental years of schooling, number of children, and parents' age at immigration. Standard errors are clustered on destination by child cohort.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table A 13c Exposure time effects of neighborhood health (S.D.) and probability of being hospitalized (accidents) among refugees

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | All | Siblings | Fam FE | Fam FE |
| Health | 0.0018 | 0.0007 | 0.0020 | 0.0020 |
| | (0.001) | (0.002) | (0.002) | (0.002) |
| Health*Immigration age<6 | -0.0004 | 0.0007 | 0.0005 | 0.0006 |
| | (0.002) | (0.002) | (0.003) | (0.003) |
| Immigration age<6 | -0.0003 | -0.0036 | -0.0056 | -0.0052 |
| | (0.002) | (0.003) | (0.005) | (0.005) |
| Time-varying controls | No | No | No | Yes |
| Mean | 0.023 | 0.024 | 0.024 | 0.024 |
| Observations | 35,754 | 18,937 | 18,937 | 18,937 |
| N clusters | 2,427 | 2,275 | 2,275 | 2,275 |

*Notes:* Results from linear probability models. Each column represents results from a separate regression. Omitted category is immigration age >5. All specifications include indicators for region of origin, child cohort, child gender, birth order, parents' civil status, destination county, and controls for parental years of schooling, number of children, and parents' age at immigration. Standard errors are clustered on destination by child cohort.
$^{*}$ $p < 0.10$, $^{**}$ $p < 0.05$, $^{***}$ $p < 0.01$

Table A 13d Exposure time effects of neighborhood health (S.D.) and probability of being hospitalized (risky behavior) among refugees

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | All | Siblings | Fam FE | Fam FE |
| Health | 0.0023 | 0.0009 | 0.0019 | 0.0017 |
| | (0.001) | (0.002) | (0.003) | (0.003) |
| Health*Immigration age<6 | -0.0010 | -0.0014 | -0.0016 | -0.0014 |
| | (0.002) | (0.002) | (0.003) | (0.003) |
| Immigration age<6 | -0.0082$^{***}$ | -0.0110$^{***}$ | -0.0079 | -0.0089 |
| | (0.003) | (0.004) | (0.007) | (0.007) |
| Time-varying controls | No | No | No | Yes |
| Mean | 0.030 | 0.033 | 0.033 | 0.033 |
| Observations | 35,754 | 18,937 | 18,937 | 18,937 |
| N clusters | 2,427 | 2,275 | 2,275 | 2,275 |

*Notes:* Results from linear probability models. Each column represents results from a separate regression. Omitted category is immigration age >5. All specifications include indicators for region of origin, child cohort, child gender, birth order, parents' civil status, destination county, and controls for parental years of schooling, number of children, and parents' age at immigration. Standard errors are clustered on destination by child cohort.
* p < 0.10, ** p < 0.05, *** p < 0.01

Table A 14 The effect of being placed in a neighborhood with one S.D. worse health on the probability of being hospitalized among refugees, immigration year 1987-1991

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Hosp | Mental | Accidents | Risky |
| Health | 0.0048 | 0.0003 | 0.0014 | 0.0014 |
| | (0.003) | (0.001) | (0.001) | (0.001) |
| Observations | 12,400 | 12,400 | 12,400 | 12,400 |
| Mean | 0.119 | 0.019 | 0.023 | 0.030 |
| N clusters | 1,714 | 1,714 | 1,714 | 1,714 |

*Notes:* Results from linear probability models. Each column represents results from a separate regression. Sample restricted to immigrants arriving year 1987-1991. All specifications include indicators for region of origin, child cohort, child gender, birth order, year of immigration, parents' civil status, destination county, and controls for parental years of schooling, number of children, and parents' age at immigration. Standard errors are presented in parenthesis and clustered on destination by child cohort. $p < 0.10$, $^{**} p < 0.05$, $^{***} p < 0.01$

Table A 15a The effect of being placed in a neighborhood with one S.D. worse health on the probability of being hospitalized among refugees, country of origin fixed effects

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Hosp | Mental | Accidents | Risky |
| Health | 0.0084* | 0.0017 | 0.0004 | 0.0019 |
| | (0.005) | (0.002) | (0.002) | (0.002) |
| Observations | 5,932 | 5,932 | 5,932 | 5,932 |
| Mean | 0.118 | 0.019 | 0.024 | 0.031 |
| N clusters | 1,117 | 1,117 | 1,117 | 1,117 |

*Notes:* Results from linear probability models. Each column represents results from a separate regression. Sample restricted to immigrants arriving year 1985-1989. All specifications include indicators for country of origin, child cohort, child gender, year of immigration, parents' civil status, destination county and controls for parental years of schooling, number of children and parents' age at immigration. Standard errors are clustered on destination by child cohort. $^{*} p < 0.10$, $^{**} p < 0.05$, $^{***} p < 0.01$

Table A 15b The effect of being placed in a neighborhood with one S.D. worse health on the probability of being hospitalized among refugees, region of origin fixed effects

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Hosp | Mental | Accidents | Risky |
| Health | 0.0079 | 0.0017 | 0.0004 | 0.0017 |
| | (0.005) | (0.002) | (0.002) | (0.002) |
| Observations | 5,932 | 5,932 | 5,932 | 5,932 |
| Mean | 0.118 | 0.019 | 0.024 | 0.031 |
| N clusters | 1,117 | 1,117 | 1,117 | 1,117 |

*Notes:* Results from linear probability models. Each column represents results from a separate regression. Sample restricted to immigrants arriving year 1985-1989. All specifications include indicators for region of origin, child cohort, child gender, year of immigration, parents' civil status, destination county and controls for parental years of schooling, number of children and parents' age at immigration. Standard errors are clustered on destination by child cohort. $^{*} p < 0.10$, $^{**} p < 0.05$, $^{***} p < 0.01$