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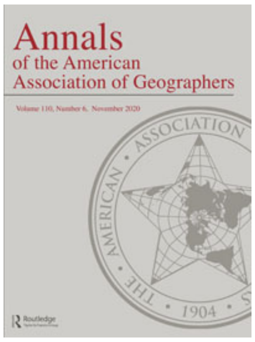

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Inherited and Spatial Disadvantages: A Longitudinal Study of Early Adult Neighborhood Careers of Siblings

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Understanding how inequalities are transmitted through generations and restrict upward spatial mobility has long been a concern of geographic research. Previous research has identified that the neighborhood in which someone grows up is highly predictive of the type of neighborhood he or she will live in as an independent adult. What remains largely unknown is the relative contribution of geography compared to the contribution of the family context in forming these individual life outcomes. The aim of this article is to better understand the role of the spatial–temporal contexts of individuals in shaping later life outcomes, by distinguishing between inherited disadvantage (socioeconomic position) and spatial disadvantage (the environmental context in which children grow up). We use a sibling design to analyze the neighborhood careers of adults after they have left the parental home, separating out the roles of the family from that of the neighborhood in determining residential careers. We employ rich Swedish Register data to construct a quasi-experimental family design to analyze residential outcomes for sibling pairs and contrast real siblings against a control group of "contextual siblings." We find that real siblings live more similar lives in terms of neighborhood experiences during their independent residential careers than contextual sibling pairs but that this difference decreases over time. The results show the importance of geography, revealing long-lasting stickiness of spatial–temporal contexts of childhood. *Key Words: hybrid model, intergenerational transmission, residential selection, siblings.*

长久以来，地理研究一直都在关注不平等性是如何通过代际传播和限制向上空间的流动性的。以往的研究发现，通过一个人成长过程中所生活的街区，能够高度准确地预测该个体在成年后将要生活的街区类型。但在形成这种个人生活结果的过程中，地理因素相比家庭背景因素所带来的影响，在很大程度上尚属未知领域。本文希望通过区分遗传劣势（社会经济地位）和空间劣势（儿童成长的环境背景），来更好地理解个体所处时空背景对塑造其今后生活结果所带来的影响。我们使用同胞对照设计的研究方法来分析成年人离开父母住所后的社区轨迹，以区分家庭与街区在决定其住所轨迹过程中所起到的作用。我们使用大量的瑞典注册数据构建了一个准实验性的家庭设计，用于分析同胞对的住所结果，并将血缘同胞与"非血缘社区同胞"对照组进行了比较。我们发现与非血缘社区同胞对相比，血缘同胞在其独立居住轨迹中的街区经历方面，其生活的相似度更高，但这种差异性会随着时间的推移而减小。研究结果体现了地理的重要性，其揭示了童年时空背景的持久粘性。 *关键词：混合模型，代际传播，居住选择，同胞。*

Entender el modo como se transmiten las desigualdades y la restricción de la movilidad espacial hacia arriba, de una generación a otra, ha sido preocupación de la investigación geográfica desde hace tiempo. La investigación precedente ha podido establecer que el vecindario en el cual crece una persona es altamente predictivo del tipo de vecindario en el que él o ella residirán como adultos independientes. Lo que si permanece sin conocerse es la relativa contribución que al respecto hace la geografía en comparación con el contexto familiar en la gestación de los resultados que definen la vida familiar de estas personas. El propósito de este artículo es entender mejor el papel de los contextos espacio-temporales de los individuos en la configuración de las formas de vida individual venideras, distinguiendo entre la desventaja heredada

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(posición socioeconómica) y la desventaja espacial (el contexto ambiental dentro del cual crecieron los niños). Usamos un diseño fraternal para analizar las trayectorias vecinales de los adultos después de que ellos abandonan la casa paterna, apartando los roles de la familia de los que conciernen al vecindario en la determinación de las trayectorias residenciales. Empleamos datos del Registro de Suecos ricos para construir un diseño familiar cuasi experimental con el cual analizar los resultaos residenciales para parejas de hermanos y contrastar hermanos reales contra un grupo de control de "hermanos contextuales". Descubrimos que los hermanos reales viven vidas más similares en términos de las experiencias barriales durante sus trayectorias residenciales independientes que los pares de hermanaos contextuales, aunnque esas diferencias decrecen con el paso del tiempo. Los resultados muestran la importancia de la geografía, revelando una adherencia duradera de los contextos espacio-temporales de la niñez. *Palabras clave: hermanos, modelo híbrido, selección residencial, transmisión intergeneracional.*

"Much of geographic and social science research is concerned with the influence of contextual or environmental factors on human behaviour, practice and experience" (Kwan and Schwanen 2018, 1473). Geographers have played a central role in the literature on neighborhood effects, which aims to understand the impact of the spatial context on individual outcomes. One of the main challenges in this field of work is to measure "how, when, and where humans are exposed to and influenced by different spatial contexts" (Pearce 2018, 1491). Many studies have taken a rather static approach to measuring spatial context by using current neighborhood characteristics as proxies for neighborhood experiences. Recently, the geographical literature on spatial context has taken a temporal turn; Kwan (2018) highlighted the temporal complexities of contextual influences and called for more emphasis on "time and human mobility in people's exposures to environmental influences" (Kwan 2018, 1482). Coulter, van Ham, and Findlay (2016) argued that such mobility should be conceptualized as a relational practice that links lives through time and space and connects people to structural conditions, including the spatial context. Within health geographies, Pearce (2018) called for more attention to be paid to spatial–temporal mobility and introduced the "life course of place" approach, placing contextual exposure into a life course framework (see also de Vuijst, van Ham, and Kleinhans [2016] on a life course approach to neighborhood effects).

The temporal dimension of the "geography of opportunity" (Galster and Sharkey 2017) is increasingly receiving attention in geography and cognate disciplines. Recent research shows that growing up in disadvantaged neighborhoods increases the likelihood of living in a similarly deprived neighborhood later in life (see, for Sweden, van Ham et al. [2014]; and for the United States, Sharkey [2013]). Sharkey (2013) also identified a secondary effect whereby if a child's parent had also grown up in a poverty neighborhood, then that child's outcomes were less favorable compared to a child with a parent who had not grown up in poverty (see also Hedman, van Ham, and Tammaru 2017). Generally, this research shows that the neighborhood outcomes of adults are linked to the neighborhoods of their childhood and the characteristics of their parents. This geographical reproduction or inheritance of neighborhood disadvantage over multiple generations is of substantial interest to academics, policymakers, and governments alike (see OECD Inequality Update 2016).

Recent work has identified intergenerational transmissions as a key issue for neighborhood effects research (see Sharkey 2013). The increasing attention on spatial inequalities and their impact puts geography at the center of understanding inequalities. Whereas sociologists generally emphasize the impact of the family context on individual outcomes, geographers are mostly concerned with the impact of the spatial context on individual outcomes. Of course, there are many intertwined pathways that influence later life residential neighborhood outcomes, of which geography is just one (others could include the family, school, and leisure activities). The relative role of geography compared to family in understanding individual life outcomes remains largely unknown, however. Previously, research has not attempted to distinguish between the effect of the childhood neighborhood history and that of the family context, because the two are not independent: Parents with certain characteristics are more likely to sort into certain neighborhoods. We argue, however, that to better understand the role of geography in social outcomes, it is important to distinguish between the different routes that influence individuals. In this article we focus on two of these routes, which we term *spatial disadvantage* and *inherited disadvantage*.

We define spatial disadvantage as disadvantages that are the result of interactions occurring beyond the household and often made operational as the local residential neighborhood context. Much of the neighborhood effects literature treats space in a nongeographic manner, either seeking to remove any impact it might have or providing average effects that negate the heterogenous impacts of different types of neighborhood (see Small and Feldman 2012). In what follows, we explicitly focus on the neighborhood as a spatial context that influences individual outcomes over the life course. There is also a lively debate on the importance of other potential spaces of interaction (see Kwan 2018), such as schools, sports clubs, and youth clubs. Most studies, however, focus on residential neighborhoods (van Ham and Tammaru 2016; Kukk, van Ham, and Tammaru 2019), because the residential neighborhood partly acts as a proxy for many of the other contexts. The location of the residential neighborhood in the wider urban context is fundamental in determining the geography of opportunity and the facilities and services to which an individual has access.

We define *inherited disadvantage* as disadvantage that is transmitted from parents to their children. It is a broad concept, which includes educational (Bauer and Riphahn 2006) and economic (Solon 1999) achievement but also cultural approaches and experiences (Vollebergh, Iedema, and Raaijmakers 2001; Elwood, Lawson, and Nowak 2015). An extensive literature has analyzed intergenerational socioeconomic transmissions and documented strong correlations between parents' and children's educational and income levels (for an overview, see Solon 1999; d'Addio 2007; Black and Devereux 2010). Separating inherited and spatial disadvantage is a major challenge for the literature on intergenerational neighborhood effects and spatial mobility (Black and Devereux 2010). The success of this separation has wider consequences for the contribution of geography to understanding inequalities: Are inequalities just unevenly distributed in urban space, or is urban space part of the explanation of such inequalities?

This article aims to contribute to the wider discussion in geography on the influence of the spatial context on individual behavior by isolating the effect of geography from the effect of family. We focus specifically on separating inherited disadvantage (socioeconomic position) from spatial disadvantage (the environmental context in which children grow up). Our approach takes an explicit life course perspective, which fits with the temporal turn in the geographical literature on spatial context (Kwan 2018). We analyze long-term neighborhood careers of adults once they have left the parental home—reconstructing their "life course of place" (Pearce 2018)—while taking into account the effects of inherited disadvantage. To isolate the effect of geography, we used a methodological approach from the literature on intergenerational socioeconomic mobility, which involves a quasi-experimental family design exploiting sibling relationships (building on work such as Solon, Page, and Duncan 2000; Lindahl 2011; Nicoletti and Rabe 2013). If sufficiently close in age, real siblings can be assumed to share both inherited and childhood spatial (dis)advantages. In contrast, unrelated individuals who have grown up in the same neighborhood but not in the same household only share the experienced spatial context. These contextual siblings can be used as a control group to separate the two sources of influence. We use rich register data from Sweden, enabling us to follow a large group of siblings (born within no more than three years from each other) over fourteen years of their independent housing careers after they left the parental home.

Literature Review

Academic interest in inequalities has mainly focused on understanding socioeconomic inequalities, but there is also an increasing interest in the spatial dimensions of inequality, outside the geographical literature. It is increasingly understood that socioeconomic and spatial inequalities are intertwined in complex ways (Kwan 2018). Living in a deprived neighborhood is not only the result of having a low income but is also the result of a combination of a complex set of preferences and restrictions (see van Ham et al. 2013). This matters if the environment an individual lives in also has an independent (causal) effect on individual outcomes—the so-called neighborhood effect (van Ham et al. 2012). The vast bulk of research on neighborhood selection and neighborhood effects makes use of point-in-time measures of neighborhood characteristics, whereas the effects of living in a deprived context can take many years to develop. Recently, there have been calls to use longer time perspectives (taking into account individual neighborhood histories and spatial biographies), including the effects of multigenerational spatial inequalities (Sharkey 2013; van Ham et al. 2014; Morris Manley, and Sabel 2018). In health geography, Pearce (2018) called for a life course of place approach, taking into account all places people frequent and are exposed to over the life course. Kwan and Schwanen (2018) also called for more emphasis on the temporality of environmental exposure, and Kwan (2018) argued that geographers can contribute to advancing temporally integrated analysis of inequalities by carefully examining how people's lives unfold in space and time.

The intergenerational dimensions of disadvantage are well developed in the literatures on socioeconomic mobility, child development, parenting styles, and health, where correlations between parental and child characteristics are commonly found. For instance, Mayer and Lopoo (2005) investigated the income elasticity of children's economic status with respect to parental economic status using Panel Study of Income Dynamics data from the United States. They demonstrated that prior to 1953, a child's income was more heavily influenced by that of his or her parents than in the more recent period, resulting in an increase in intergenerational mobility. This finding contrasts substantially with other studies, including that of Hauser (1998), who concluded that income mobility decreased in the same period, demonstrating the greater importance of spatial and intergenerational transmission effects. Moving beyond income, De Nardi (2004) documented inequality in wealth and demonstrated that the intergenerational transmission of wealth is greater than that of income. De Nardi also highlighted, however, that the presence of wealth within a single generation does not necessarily transmit to wealth in future generations: The persistence of wealth requires the specific intervention of bequests specifically designed to protect wealth, whereas voluntary or accidental bequests do not result in the same intergenerational inequalities.

Previous research has added a spatial dimension to the intergenerational transmission of disadvantage, where the well-being and development of children are influenced by where the family lives, highlighting the role of geography. Research has shown a path dependence between childhood neighborhoods and neighborhood experiences later in life (Kleinepier and van Ham 2017; Kleinepier, van Ham, and Nieuwenhuis 2018). These intergenerational transmissions of neighborhood are important in understanding the reproduction and spatial concertation of (dis)advantage. In the United States, Sharkey (2013) demonstrated that children who grew up in poorer neighborhoods were more likely to live in a poorer neighborhood later in life than others. This reinforces the transmission of inequalities as children experience the same spatial opportunity structures (see Galster and Sharkey 2017) as their parents, reducing their likelihood of being socially mobile (see also Vartanian, Buck, and Gleason 2007). Turning to the European experience, van Ham et al. (2014) demonstrated that, even in a strong welfare state country such as Sweden, where inequalities are substantially lower than in the United States, similar intergenerational transmissions of place still occurred (see also Gustafson, Katz, and Österberg 2016). Recently, de Vuijst, van Ham, and Kleinhans (2017) demonstrated similar findings using population register data from The Netherlands. Taken together, these findings suggest that to understand adult spatial outcomes in the neighborhood hierarchy—in other words, who lives in which types of neighborhoods—we must take into account childhood neighborhood experiences as well as other parental resources.

This literature suggests that the outcomes that children experience as adults are potentially shaped by both family and neighborhood contexts in their early years. Coulter, van Ham, and Findlay (2016) placed these relationships in a discussion on relationality, which has its roots in economic geography (Sunley 2009; Jones 2014), urban studies (Jacobs 2012), and family sociology (Mason 2004). They use Bailey (2009) to explain that life course perspectives are implicitly relational through time and space. Neighborhood biographies are the result of explicitly relational processes linking individual lives to structural conditions. These "relational effects have been described in many different ways (e.g. historical dependence, spillover of life-course effects), but they remain poorly understood and their evaluation presents major methodological challenges" (Kwan and Schwanen 2018, 1474). The relative importance of family versus (childhood) neighborhood for later-in-life socioeconomic outcomes has been empirically tested in several studies that generally show that the family context is the most important (see Black and Deveraux [2010], for an overview). Indeed, some studies, such as Oreopoulos (2003) and Lindahl (2011), find neighborhood effects close to zero, suggesting that the impact of the (childhood) residential environment for future socioeconomic status is almost nonexistent. The discussion of the relative importance of inherited versus spatial disadvantage has not yet made its way into the geographical literature on neighborhood selection, housing careers, and transmission of neighborhood status across generations, at least not as far as we are aware. We argue that this discussion is crucial for debates on the importance of geography in understanding individual outcomes.

Approach and Hypotheses

Establishing a true causal relationship between the parental and familial context, the geographical (neighborhood) context, and outcomes later in life is a major methodological challenge. One approach is to use an experimental design. With the exception of the experimental programs in the United States (Gautreaux, Moving to Opportunity, and HOPE VI; see Katz, Kling, and Liebman 2000), however, these are rare. An alternative is to use a quasi-experimental approach, which can be constructed using observational data for siblings and explore outcomes for pairs of individuals who share both residential and familial contexts. Crucially, the shared family context controls for many unobserved biases. For instance, Raab et al. (2014) used sibling pairs to understand the influence of early childhood and family structure on children's later life family formation. Merlo et al. (2013) used a similar design to investigate the linkage between health—in this case ischemic heart disease—and the neighborhood context. Investigating health outcomes, Davis et al. (2012) used geocoded twin data to explore the relative impacts of nature and nurture contrasted with where children grow up. Finally, looking at income, Vartanian and Buck (2005) used siblings to examine the impact of neighborhood context on adult earnings.

In this study we use sibling pairs to better understand the role of inherited and spatial disadvantage on later life neighborhood outcomes. We will use both real full siblings and contextual siblings—unrelated individuals who have grown up in the same neighborhood but not in the same household and therefore only share a spatial context. These contextual siblings are used as a control group to separate the effects of inherited and spatial disadvantages. We seek to identify the relative importance of the neighborhood as a site of experience compared to the role of the family as a determinant of the later residential career that individuals pursue. This provides new insight into the complex issue of the environments through which intergenerational transmissions might occur. To guide the analysis, we present three research questions: First, we investigate whether children who grow up in the same neighborhood environment have similar post-childhood trajectories of neighborhood outcomes. Previous research (van Ham et al. 2014) has suggested that this will be the case and provides the rationale for the first hypothesis:

> Hypothesis 1: After controlling for family environment, the childhood neighborhood will continue to be a site of significant influence on later life neighborhood careers.

The second research question relates to the problem of multiple contexts that could influence individual outcomes. To date, the literature has not isolated the relative contributions of the family from those of the neighborhood and, as a result, we have been unable to make inferences on the relative contributions of inherited or spatial inequality. In line with findings from the socioeconomic literature, we hypothesize that the most significant context will be the family in which an individual grows up:

> Hypothesis 2: After controlling for family influences, the neighborhood contribution to understanding later-in-life neighborhood outcomes will be significantly reduced in comparison to models that only consider childhood neighborhood.

We expect that we can reveal the effects of the family context by comparing real siblings—who share family and neighborhood context—with contextual siblings, who only share the neighborhood context. The differences in outcomes between these two groups should shed some light on the effects of the family context on neighborhood trajectories later in life.

> Hypothesis 3: The contribution that neighborhood and family environments make to later-in-life neighborhood outcomes will remain throughout later life but will attenuate over time.

Data and Methods

To distinguish between the relative impact of family versus neighborhood, or inherited versus spatial disadvantage, we use a quasi-experimental family design based on siblings. To do so requires two subsets of data. The first subset consists of pairs of individuals identified as full siblings (sharing mother and father). Full siblings share a substantial part of their genetic background and, if born sufficiently close in time, it can be assumed that they have been raised in similar circumstances with exposure to similar norms and values. In addition, they will have been exposed to the same neighborhood environment at similar life stages (although peer and other interactions are still likely to differ). Hence, siblings share both family and geographic contexts that we expect to affect their future neighborhood careers. The second subset is composed of a control group of what we call contextual siblings. These are pairs of people who are not family but have shared the same neighborhood contexts during childhood. As a consequence, these pairs share a geographic context but not a family context. The use of the control group allows us to identify the relative contribution of the experienced context and the family context on neighborhood outcomes later in life.

The data used for this study are derived from GeoSweden, a longitudinal microdatabase owned by the Institute for Housing and Urban Research at Uppsala University, which contains the entire Swedish population at the individual level between 1990 and 2010. The database contains administrative registers including demographic, geographic, socioeconomic, and real estate data for all individuals living in Sweden. Each individual is assigned a unique identification number, ensuring that linking individuals annually and over time is possible. For each person in the data set it is possible to identify the mother and father (biological or adoptive) via his or her identification number, which also enables us to identify siblings.

Because we wish to follow the siblings' independent housing paths for as many years possible, we only select individuals who live with their parents at the start of the data collection (1990) and for whom we have consecutive data for the full period. This allows us to have the longest possible follow-up period and also obtain information about the parental neighborhood. Ideally, we would have liked to have more information on childhood neighborhood experiences from birth, but increasing the observation period during childhood comes at the expense of the observation period during adulthood. Given the focus of the article, we prioritized having a longer period after children leave the parental home and assume that the neighborhood at the moment of leaving the parental home is a good proxy for childhood exposure.

To be included in the research population, the real sibling pairs must (1) be in the age range of fifteen to twenty-one years old in 1990; (2) be born no more than three years apart; (3) both have lived in the parental home in 1990; (4) include at least one sibling who left the parental home between 1991 and 1993; and (5) include the other sibling leaving the parental home no more than four years after the first sibling. These age and time restrictions ensure that our real sibling pairs had similar neighborhood and family experiences during their childhood. For families where the mother and father have separated, the parental home could be that of either parent as long as both siblings live together. We chose to only compare one sibling pair within each family. Where households have multiple sibling pairs within the same family that fulfill the given criteria, we selected the sibling pair closest in age. This maximizes the likelihood that the pair had similar experiences during childhood. If there are several potential sibling pairs of the same age range, we have selected pairs according to (1) data availability, (2) same gender, and (3) age, with preference for the oldest pair. Selecting only one sibling pair per household reduces the complexity of the analyses. After these restrictions, we ended up with a data set containing 49,074 sibling pairs, or 98,148 individuals. Each individual in the data is followed for a consecutive fourteen-year period.

Key to our study is that we are able to separate the relative contributions of the family in which an individual grows up from that of the context in which that family is set—the neighborhood. To do so, we need a control sample who do not share the family context but who lived in the same neighborhood. We therefore constructed a control group of what we call contextual siblings. These synthetic sibling pairs are completely unrelated and do not share family, household, or genetic backgrounds; they only share childhood neighborhood experiences. For comparability it is important that these contextual siblings have a similar type of family background. This ensures that differences in neighborhood careers are not due to differences in background, which we ensure by having parents (fathers) from the same country region and of similar income levels (being a low-, middle-, or high-income earner; variables are described in more detail later). Contextual sibling pairs are created by selecting all individuals who satisfied the age range criteria (fifteen to twenty-one in 1990) and then randomly allocated to a pair while ensuring the conditions related to neighborhood of origin, father's country background, and income level (which must be the same within a pair). We then subject the contextual sibling pairs to the same restrictions as our real sibling pairs and keep only the pairs who fulfill all criteria: (1) they should be born no more than three years apart; (2) at least one should leave the parental home between 1991 and 1993; and (3) they should leave home a maximum of four years apart. After deletion of any (genetically) related pairs, we are left with a set of 5,177 contextual sibling pairs for which sufficient data are available. We acknowledge that our approach is a relatively simple form of matching individuals into contextual sibling pairs. Alternative, more advanced approaches (e.g., propensity score matching), however, would make it less likely that we would be able to create contextual pairs who were colocated in the same neighborhood without substantially reducing the sample.

The sibling pairs, real and contextual, are the basic unit for our analyses, although we also keep individual-level information. Many characteristics used in the study measure differences between siblings, such as age difference and whether they are of the same sex. The dependent variable in our analyses also measures difference, in this case the difference in residential neighborhood status: How different are real siblings in terms of their neighborhood status after having left the parental home? Are they less different than the contextual siblings? How does that vary by neighborhood socioeconomic status? Thus, neighborhood is central to our concern, because the analysis seeks to determine the longer term influences that lead to the spatial expressions of opportunity that we observe in the contemporary urban environment. Neighborhood status can be conceptualized in many ways. It could, for instance, refer to the physical infrastructure, the amount of green space, or the connectedness to the rest of the urban environment. In this study we focus on the income distribution in the neighborhood. Income is a common basis for studies of residential segregation. In Sweden, as elsewhere (see Tammaru et al. 2016), segregation by income has increased over the last twenty years (Hedman and Andersson 2015). Our definition of neighborhood status uses the share of low-income individuals within the neighborhood from the working-age population (between twenty and sixty-four years old). A low-income individual is defined as a person whose income from work, including work-related benefits,[1] belongs to the three lowest deciles among the national income distribution.[2]

Finally, although there are many different ways in which spatial neighborhoods can be operationalized, we define them pragmatically using small area market statistics (SAMS) areas.[3] The SAMS classifications scheme is made by Statistics Sweden in collaboration with each respective municipality to distinguish relatively homogenous areas in terms of housing type, tenure, and construction period. The division is frequently used in Swedish studies of segregation and residential careers, enabling the work presented here to be compared with much of the previous Swedish literature. We acknowledge that the SAMS areas are politically defined neighborhoods, rather than neighborhoods based on individual experiences. For our sibling design, though, we need a large number of siblings, which implies that it is not possible (or allowed when using register data) to ask people to delineate their own experienced neighborhoods. Figure 1 shows a map with SAMS areas for the Central Stockholm area to illustrate the spatial extent of the neighborhoods used.

We want to model the differences between neighborhood outcomes within sibling pairs (real pairs and contextual pairs). A standard approach would be to use a fixed effects model, which keeps all time-invariant control variables fixed, so in practice these characteristics are controlled in the model. Our most important individual independent variable, however—the type of sibling pair (real or contextual)—is also a fixed characteristic and therefore could not have an explicit coefficient in a fixed effects model. As a solution, and to obtain estimates for such time-invariant characteristics, we use an alternative approach known as the hybrid model (see Allison 2009), which allows both the traditional econometric favored fixed effects analysis to be estimated alongside the random effects required to assess the impact of neighborhood and therefore allows geography to be included in the model.

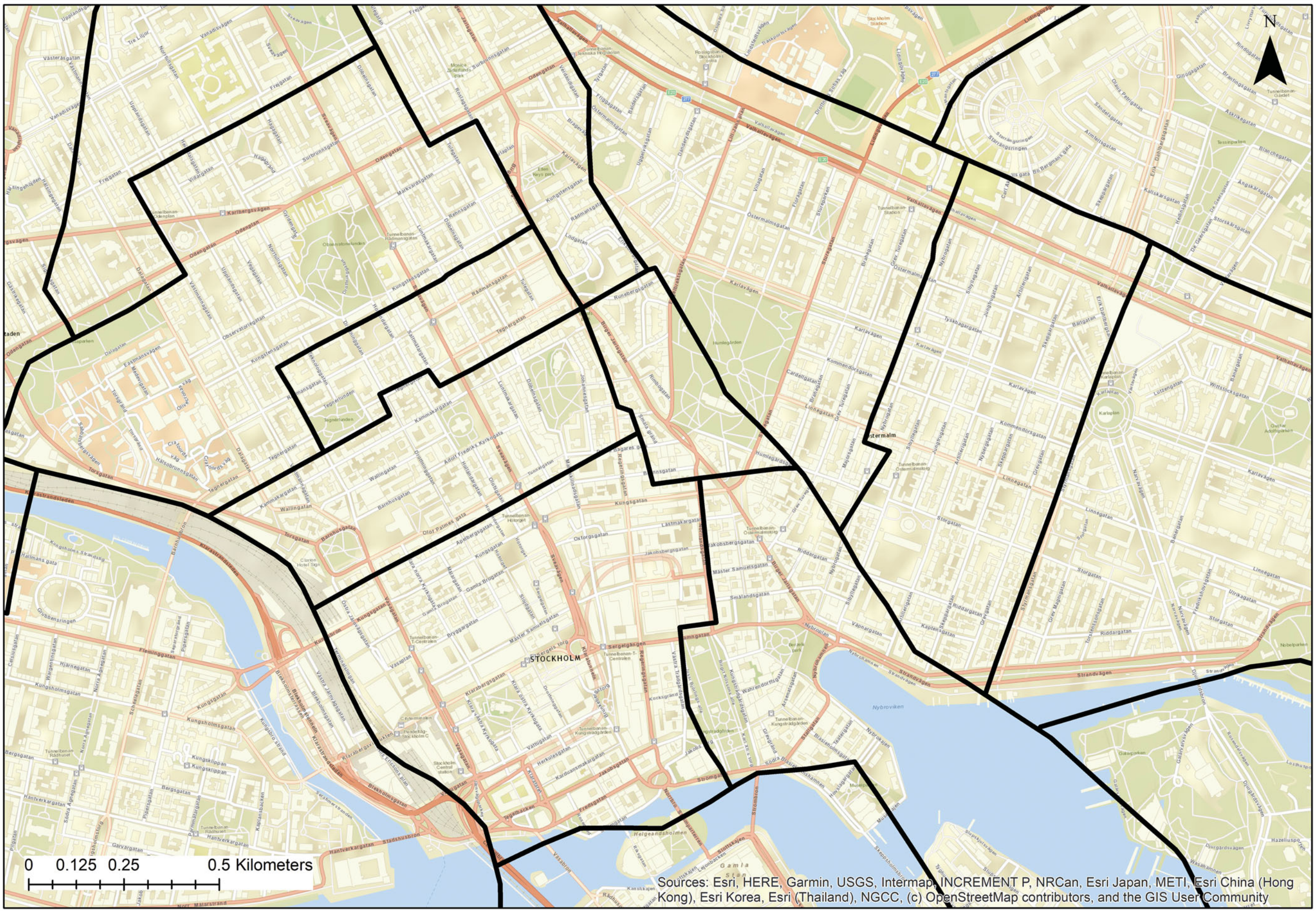

Figure 1. Example of Stockholm small area market statistics.

The independent variables in our models measure demographic, socioeconomic, and housing characteristics for each pair that are known to affect residential mobility and neighborhood choices. These characteristics include gender, marital and partnership status (couples can only be identified when they are married or have children), the number of children, and whether or not someone was a student. This means that many cohabitants (a common form of living among young Swedes) are unfortunately classified as singles.[4] Income is measured as income from work, including work-related benefits, and is adjusted for inflation and reported in units of 100 SEK.[5] Housing tenure is measured in three categories: homeownership, tenant-owned cooperative,[6] and rental. Finally, we argue that siblings could be expected to develop more independent housing pathways if they live further apart after leaving the parental home. To capture this, we included a variable reporting whether or not the siblings lived in the same municipality and whether they remained in the municipality of their parents.

To capture the characteristics of parents rather than the individuals themselves, two further variables are derived. Country of birth is measured at the parental level because having an immigrant background affects neighborhood outcomes for second-generation immigrants. Parents' country of birth is classified into four large regions: Sweden, other Western countries, Eastern Europe including Russia, and non-Western countries. If parents are from different regions,[7] we classify siblings based on the region of the mother. For contextual sibling pairs, both individuals must have parents from the same region. The variable measuring parents' neighborhood status aims to capture potential intergenerational effects. It is measured in the same way as children's neighborhood status; that is, as the share of low-income people among the working-age neighborhood population. It is measured the year before the first sibling left the parental home, or in 1990 where the first sibling has already left.

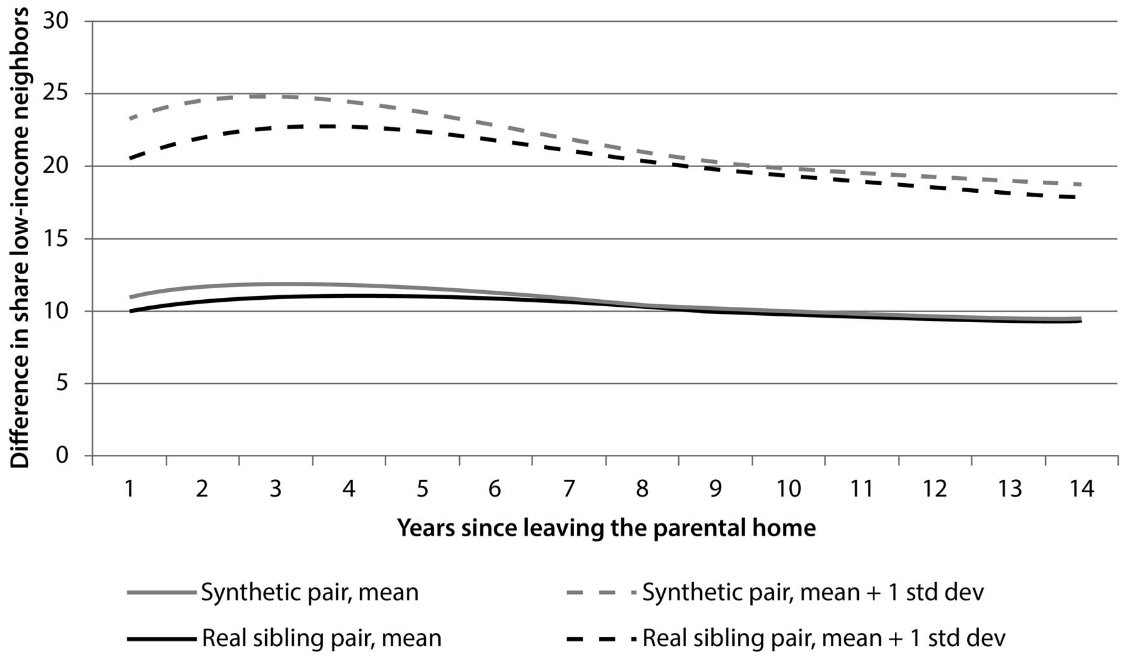

Figure 2. Difference in share of low-income neighbors between siblings, contextual and real sibling pairs. Figures show mean difference and mean + one standard deviation.

Descriptive Results

We compare neighborhood outcomes within real and contextual sibling pairs, and we expect that both will exhibit similarities because of the shared neighborhood histories within the pairs. We also expect that there will be an additional effect, exhibited through greater similarity, for the real siblings, because they also share family history, upbringing, parental background, and genes. Figure 1 shows the mean difference in the share of low-income neighbors between sibling pairs for both the real and contextual sibling pairs. The mean for the real siblings is lower, demonstrating that real siblings are less different from each other than contextual siblings in terms of the status of the neighborhood they inhabit after leaving the parental home. This is as expected.

Figure 2 also shows that the difference in neighborhood status between siblings is relatively stable over time (about ten percentage points) although there is slightly more variation in the period immediately after leaving the parental home. This finding is because expected because residential outcomes are likely to diverge more as children enter the housing market for the first time after leaving the parental home. At this point in time, some individuals will continue in higher education, perhaps as students, and enter into student housing, and others will enter the labor market. There will also be larger demographic variation in this period of early independence as some home leavers will pursue their residential career alone and others in couples and partnerships.

Figures 2 and 3 show the mean difference between sibling pairs for real (Figure 2) and contextual (Figure 3) siblings. These figures show separate lines for siblings with different types of parental neighborhoods by income. Neighborhood types are based on the share of low-income neighbors split into deciles (recalculated annually) with Decile 1 representing neighborhoods with the lowest share of low-income neighbors and Decile 10 representing neighborhoods with the highest share. For presentation purposes we combined the lines of the middle category neighborhoods (Deciles 3–8), because there is little variation across these groups. Both graphs show that the differences in siblings are similar over time, with the majority converging on a difference of between 9 and 10 percent for both real and contextual siblings. The group who lived in Decile 10 do not conform to this trend, whereby even thirteen years after leaving the parental home there is a greater average difference (12 percent real and around 11 percent contextual). A probable explanation is that some children from these neighborhoods, including some children within the same family, do relatively well, whereas others remain in the poorest areas into adulthood. By contrast, it is less probable that children who grow up in wealthier neighborhoods end up in the poorest neighborhoods later in life. Comparing Figures 3 and 4, we can, however, draw the same conclusion as previously, namely, that the difference between real siblings (Figure 3) is smaller than that for contextual sibling pairs (Figure 4) for all parental neighborhood deciles. The mean difference between real siblings from Decile 9, however, is larger than the mean difference for contextual pairs from Deciles 1 through 8. We concluded, therefore,

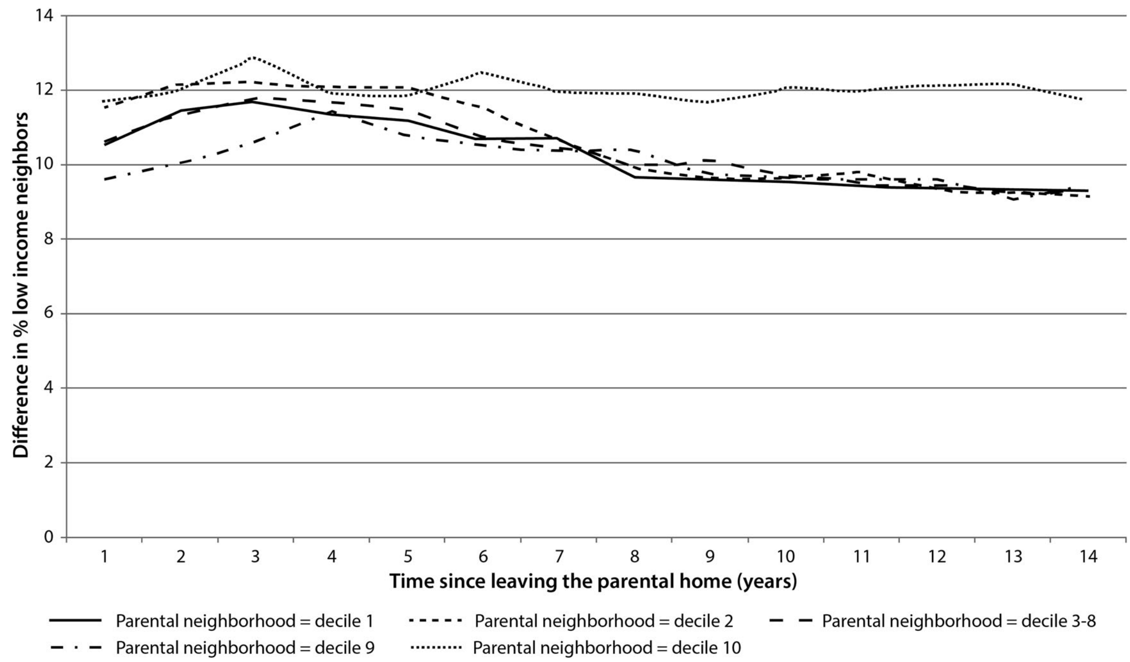

Figure 3. Mean difference in share of low-income neighborhood between real siblings, by parental neighborhood low-income share (Decile 1 = lowest [richest]).

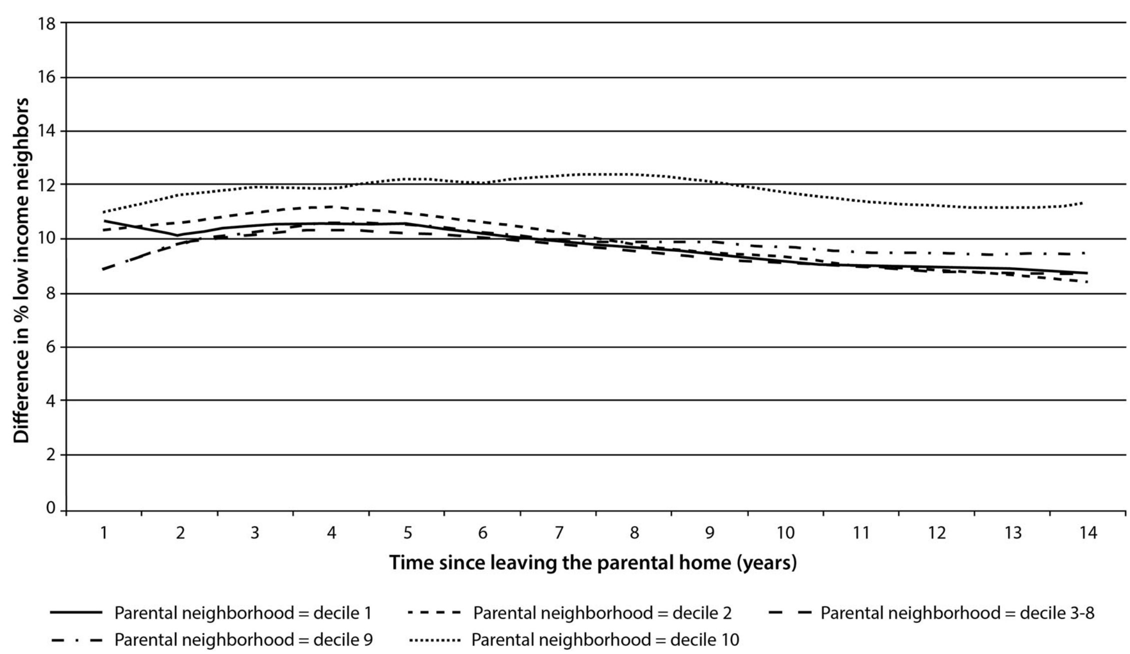

Figure 4. Mean difference in share of low-income neighborhood between contextual siblings, by parental neighborhood low-income share (Decile 1 = lowest [richest]).

Table 1. Descriptive statistics, all years in data

Parental characteristics, absolute values		Real siblings	Contextual siblings
Share low-income neighbors in parental neighborhood	M	*28.99*	*28.34*
	SD	*8.52*	*7.28*
Country of birth of fathers	Sweden	89.76	93.86
	West	6.83	3.98
	East	1.42	0.71
	Non-West	1.99	1.45
Income level of fathers	Low	12.76	9.87
	Medium	23.37	22.64
	High	63.87	67.49
Characteristics of sibling pairs			
Difference in share low-income neighbors	M	*9.07*	*10.45*
	SD	*8.52*	*10.88*
Age difference between siblings	0 years	3.87	19.90
	1 year	15.55	36.82
	2 years	41.75	25.73
	3 years	38.83	17.56
Sex composition	Both male	22.98	22.54
	Both female	29.09	27.29
	One male, one female	47.93	50.16
Civil status	Both singles	40.33	40.85
	Both with partners	20.12	19.05
	One single, one with partner	37.07	37.85
Children in household	None has children	43.47	42.25
	Both have children	19.79	18.63
	One has children, one not	34.14	36.82
Logged income difference (100 SEK, money value of 1990)	M	*1.63*	0.88
	SD	*2.26*	0.99
Student status	None is a student	66.84	66.40
	Both are students	6.63	4.39
	One student, one not	23.51	26.54
Tenure	Both in rental	21.20	19.95
	Both in cooperative	4.78	3.64
	Both in ownership	15.06	14.22
	One in rental, one in cooperative	12.15	14.10
	One in cooperative, one in ownership	8.80	9.66
	One in rental, one in ownership	18.90	21.49
Municipality	Same municipality, parental one	38.77	31.39
	Same municipality, not parental one	8.20	4.04
	Different municipalities	53.03	64.57
N (all years)		687,022	72,478
N (unique sibling pairs)		49,073	5,177

Note: Values in percentages for categorical variables. Continuous variables are shown in italics.

that it is important to take the parental background into account when trying to understand what kind of neighborhoods people enter later in life as adults.

Table 1 reports descriptive statistics for all variables used in the subsequent models of neighborhood outcomes. The most important aspect of Table 1 is that the characteristics of the control group (the contextual siblings) are similar to the characteristics of the real sibling pairs, with three exceptions. The first difference is age, where the real siblings were on average born further apart. A working hypothesis here is that siblings closer in age will live more similar lives and thus this difference would make the contextual pairs less different than the real pairs.

The second difference relates to income, where differences between the contextual siblings are smaller than those between the real siblings. This could be related to the smaller age differences for contextual siblings. Again, this would suggest that the contextual pairs are less different than real siblings, all else being equal. Finally, there is also a difference in the municipality in which the siblings live during adulthood, with real siblings more likely to live in the same municipality, regardless of whether it is the parental municipality or not. Although we hypothesize that geography can affect differences in neighborhood status, this variable could also be regarded as part of the independent housing career. The fact that siblings are more likely to live in the same municipality as adults, regardless of whether this is the original one or not, might be a sibling effect.

The other descriptive information in Table 1 gives insight into the characteristics of the research population. For instance, both real and contextual siblings come from parental neighborhoods with on average 30 percent low-income residents. The majority come from native families and have high-income fathers.[8] In their subsequent housing careers (Table 1 shows descriptive statistics for all sibling pair-years), the contextual sibling pairs live in neighborhoods with, on average, 10.5 percentage points difference in the share of low-income people, whereas the number for the real pairs is lower. The sex distribution is even, with about half of the pairs being single sex and the other half being mixed. The most common family type combination for both types of siblings is single and without children, although mixed pairs are also common. Income differences are small on average. In the majority of the sibling pair-years, neither are students, although one of the pair having student status is not uncommon. The most common tenure type for the pairings is both in rental housing, but it is almost as common that one of the siblings has made the move into homeownership.

Modeling Differences within Sibling Pairs

The descriptive statistics from Figures 1 through 3 and Table 1 suggest that real sibling pairs live more similar lives than contextual ones. This similarity could be the result of a family effect. To test whether this effect remains after controlling for all background variables (as identified in Table 1), which all are likely to affect the relative difference in neighborhood quality between siblings, we ran a fixed effects model with a Mundlak correction. Table 2 shows the results of three models. The model on the left includes all sibling pairs, both real and contextual. The model in the middle only includes the real sibling pairs, and the model on the right only includes the contextual sibling pairs.

With the joint model we show the differences between the two types of sibling pairs by interacting the independent variables related to parental background with type of sibling pair to reveal how these background variables affect differences in neighborhood status. The other independent variables are used as controls. Overall, the joint model shows that the tentative conclusion from the descriptive analysis is confirmed: Real siblings live more similar lives in terms of neighborhood experiences than contextual sibling pairs (see the negative coefficient for the contextual sibling pair). Given that both types of pairs share the same childhood neighborhood environment, it is likely this difference is the result of a family effect. Returning to the original hypothesis, as suggested in the Introduction, this finding suggests inherited disadvantages. We also find a clear year trend where the difference in neighborhood quality between the pairs is reduced eight years after leaving the parental home.

We suggest that this is due to individuals reaching a more stable position in the housing market where housing and neighborhood environment represent a longer term choice. The year effect is not as strong for real siblings, however. This demonstrates the decrease in family influence over time. In other words, there could well be a "long arm" of the parental home, but its reach is temporally restricted. In terms of the structure proposed, the impact of inherited disadvantage reduces over time. Real siblings are still less different than contextual pairs (sibling effect and interaction combined), but the difference gets smaller with time, indicating a quicker attenuation of the family effect on residential outcomes than the neighborhood effect.

Previously, work has found that an individual's childhood environment is often reproduced into adulthood (van Ham et al. 2014). In this study, we analyze the effect of the parental neighborhood on the differences in neighborhood status within sibling pairs, rather than the actual neighborhood outcome. We find a statistically significant effect of the parental neighborhood, suggesting that the difference in neighborhood status between siblings is positively related to the share of low-income people in the parental neighborhood. Thus, siblings brought up in less advantaged neighborhoods exhibit a greater diversity of neighborhood paths as adults. That this

Table 2. Results of hybrid model.

		All			Real pairs only			Contextual pairs only		
		Coefficient	*SE*	Significance	Coefficent	*SE*	Significance	Coefficient	*SE*	Significance
Between: Time-invariant variables										
Random (0) or real sibling pair	Random	Ref	Ref	Ref						
	Real	–1.762	0.476	***						
Years since leaving the parental home	0–7 years	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	8–14 years	–1.093	0.070	***	–0.684	0.026	***	–1.101	0.093	***
	*8–14 years * real sibling*	0.405	0.070	***						
% Low-income people in parental neighborhood		0.040	0.012	**	0.052	0.003	***	0.036	0.012	**
	*% low income * real sibling*	0.011	0.012							
Country of birth of father	Sweden	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	West	0.012	0.411		0.523	0.101	***	–0.005	0.433	
	East	2.900	0.999	**	1.293	0.213	***	2.935	1.048	**
	Non-West	2.226	0.744	**	2.069	0.190	***	1.991	0.790	*
	*West * real sibling*	0.508	0.424							
	*East * real sibling*	–1.610	1.021							
	*Non-West * real sibling*	–0.174	0.766							
Income level of father	Low	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Middle	–0.613	0.309	*	–0.065	0.088		–0.607	0.325	
	High	0.278	0.287		0.202	0.077	*	–0.245	0.302	
	*Middle * real sibling*	0.552	0.321							
	*High * real sibling*	0.490	0.298							
Age difference	0 years	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	1 year	0.647	0.121	***	0.769	0.145	***	0.377	0.223	
	2 years	0.767	0.115	***	0.896	0.136	***	0.363	0.247	
	3 years	0.796	0.116	***	0.920	0.136	***	0.456	0.271	
Sex difference	Both male	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Both female	–1.001	0.070	***	–0.979	0.073	***	–1.175	0.248	***
	One male, one female	–0.416	0.062	***	–0.389	0.064	***	–.704	0.213	**
Within: Time-variant variables (deviations from mean)										
Difference in couple formation	Both singles	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Both with partners	–0.470	0.057	***	–0.493	0.059	***	–0.198	0.214	
	One single, one with partner	–0.024	0.037		0.007	0.038		–0.236	0.142	
Children in household	Both no	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Both yes	0.425	0.060	***	0.391	0.062	***	0.832	0.223	***
	One yes, one no	0.258	0.040	***	0.255	0.041	***	0.316	0.150	*
Income difference (100 SEK ~ 10 euro)		0.104	0.005	***	0.101	0.006	***	0.294	0.042	***
Difference in student status	None is a student	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Both are students	3.76	0.047	***	3.761	0.048	***	3.646	0.197	***

(*Continued*)

Table 2. (*Continued*).

		All			Real pairs only			Contextual pairs only		
		Coefficient	*SE*	Significance	Coefficent	*SE*	Significance	Coefficient	*SE*	Significance
	One student, one not	1.608	0.027	***	1.574	0.028	***	1.849	0.098	***
Difference in tenure	Both in rental	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Both in cooperative	–3.214	0.059	***	–3.229	0.061	***	–2.990	0.219	***
	Both in ownership	–2.526	0.044	***	–2.502	0.045	***	–2.807	0.154	***
	One in rental, one in cooperative	–0.468	0.037	***	–0.411	0.039	***	–1.100	0.125	***
	One in cooperative, one in ownership	–1.362	0.045	***	–1.326	0.047	***	–1.776	0.154	***
	One in rental, one in ownership	1.208	0.033	***	1.270	0.035	***	0.536	0.115	***
Difference in municipality	Same municipality, parental one	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Same municipality, not parental one	0.652	0.062	***	0.592	0.064	***	2.111	0.274	***
	Different municipalities	3.667	0.036	***	3.699	0.038	***	3.239	0.133	***
Means of time-variant variables										
Difference in couple formation	Both singles	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Both with partner	1.093	0.217	***	1.057	0.225	***	1.527	0.791	
	One single, one with partner	1.061	0.169	***	1.059	0.176	***	1.114	0.594	
Children in household	None have children	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Both have children	–0.913	0.204	***	–0.862	0.212	***	–1.481	0.763	
	One has children, one not	–0.215	0.153		–0.188	0.159		–0.534	0.547	
Income difference (100 SEK ~ 10 euro)		0.391	0.018	***	0.314	0.020	***	0.688	0.165	***
Difference in student status	None is a student	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Both are students	8.772	0.254	***	8.819	0.262	***	8.075	0.983	***
	One is student, one not	2.146	0.140	***	2.000	0.147	***	3.050	0.491	***
Difference in tenure	Both in rental	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Both in cooperative	–2.876	0.221	***	–2.796	0.229	***	–4.129	0.843	***
	Both in ownership	–4.800	0.150	***	–4.741	0.156	***	–5.585	0.533	***
	One in rental, one in cooperative	–0.200	0.162		0.328	0.171		–1.147	0.529	*
	One in cooperative, one in ownership	–1.509	0.181	***	–1.367	0.190	***	–2.962	0.576	***
	One in rental, one in ownership	0.196	0.162		0.224	0.150		–0.423	0.465	
Difference in municipality	Same municipality, parental one	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Same municipality, not parental one	–0.517	0.138	***	–0.447	0.142	**	–1.450	0.602	*
	Different municipalities	3.258	0.071	***	3.269	0.074	***	3.073	0.238	***
Constant		6.393	0.479	***	4.458	0.193	***	7.320	0.640	***
N		700,687			642,081			58,606		
Number of groups		52,566			47,574			4,992		
Average observations per group		13.3			13.5			11.7		
R^2 (within)		0.0604			0.0612			0.0549		
R^2 (between)		0.1785			0.1813			0.1526		
R^2 (overall)		0.1028			0.1041			0.0922		

Note: Dependent variable = difference in share low-income neighbors between siblings (real and contextual pairs).
***significant at the 0.001 cut off; **significant at the 0.01 cut off; *significant at the 0.05 cut off.

result holds for both real and contextual pairs suggests that this finding is the result of the neighborhood environment—a spatial disadvantage—rather than an inherited disadvantage (family).

When analyzing the effects of ethnic background, we find that siblings born to parents from outside Sweden, and especially from non-Western countries, are substantially different compared to siblings born to Swedish parents. Again, this signals that some children from less resource-rich backgrounds do well in the housing market, but others (in this case their siblings) remain in areas similar to their childhood neighborhood environment. Thus, in Sweden, those from the most disadvantaged backgrounds have a greater heterogeneity in outcomes than those from more resource-rich environments. The difference is substantially smaller for real siblings compared to the contextual pairs. Part of the explanation for this effect could be related to how we constructed the data. In the data, contextual pairs did not have a restriction that required that both parents come from the same country, only that the region in which those countries were located was the same. We cannot exclude a family effect in this outcome, however. The effect of the income level of the father on later neighborhood outcomes is not so clear: Having a middle-income father reduces the difference in neighborhood outcomes compared to the low-income earner, but the effect is only barely statistically significant. We find no evidence of differences between real and contextual pairs with regard to parental income background.

The middle column of Table 2 presents modeling results for the real siblings. The results from Table 2 explain what affects the differences in neighborhood status of siblings (the model on the right for contextual pairs is shown for comparison). The patterns for the parental variables described earlier are intact, although the strength of the relationship changes, especially for the ethnicity variables. We also find that, for real siblings, children with fathers from non-Western countries exhibit greater diversity in neighborhood outcomes than those whose fathers come from Eastern European countries. The age difference effect is highly significant for the real siblings, which shows that, with increasing age difference, the differences in neighborhood outcomes increase. This age effect is not significant for contextual pairs (right column), suggesting that it is the result of a family effect. In both cases, we find that sibling pairs with two females are less different than both same-sex male and mixed-gender sibling pairs.

The remaining individual variables included in the models give the within-person estimates. The main results from the within part of the model for real siblings (middle model) are that the neighborhood trajectories of siblings are increasingly different when the difference in sibling income increases, when children are born, when one or both are studying, and when one or both of the siblings moves out of the parental municipality. The difference also increases when one sibling leaves the rental segment to become a homeowner. The trajectories of siblings become less similar when both have partners and when they live in any other housing tenure combination than two rentals or one renter–one owner. These patterns are similar for the contextual pairs, although there are differences in the sizes of the coefficients. For example, the income coefficient is 0.294 for contextual pairs compared to 0.101 for real siblings, and the coefficients for living in the same municipality but not the parental one are 0.5 and 1.3, respectively. We suggest that both of these results indicate a family effect—real siblings are less prone to move to more different areas as their incomes increase (or decrease), which might be due to socialization or affection (if living close in space), whereas the effect for municipality might be due to siblings actively choosing to live in the same municipality and hence the same (or a nearby) neighborhood.

Whereas the explanatory power of our models is rather limited for within variation (this accounts for about 6 percent), the model is substantially better in explaining differences between sibling pairs (about 18 percent of the variation for real siblings). The results suggest that in sibling pairs, where at least one of the pair has a partner, the difference in income of that sibling pair is larger, and where one (or both) are students, their lives are more different compared to other sibling pairs. This is also the case for siblings living in different municipalities. Sibling pairs where one or both have children and where both live in one of the two ownership segments (either the same or in different ones) are less different in terms of neighborhood quality. Again, we find very similar results for real siblings and our contextual sample, which could be expected when analyzing differences between pairs.

Our models support the idea that real siblings are more similar than contextual siblings, as we observed in the descriptive tables and figures. The models also support the conclusion that parental background has a stronger influence on real siblings from more deprived neighborhoods than on those from more affluent areas. In other words, coming from a deprived neighborhood reduces later life access to good neighborhoods. This is despite greater variability in their independent neighborhood careers after leaving the parental home. As previously discussed, a hypothetical explanation for this latter finding is that individuals from the most deprived areas move "up" in terms of neighborhood quality, whereas those in the wealthiest neighborhoods are unlikely to move "down" (excepting during the first years of the independent housing career, often as a result of continuing education and living in student accommodation). For completeness we present the means of time-variant variables, but we do not provide further interpretation.

Figure 5 provides additional analysis by plotting the share of low-income people in the "best" neighborhood (i.e., the one with the lowest share of low-income residents) that each sibling lives in during the fourteen years. We separate graphs by parental neighborhood decile. For presentation purposes, we only show the results for Decile 1 (the richest neighborhoods) and Decile 10 (the poorest). The diagonal line represents the case where there is no difference between siblings. The graphs highlight two aspects. First, individuals growing up in Decile 1 live, on average, in better neighborhoods themselves later in life. The points in Figure 5A are clustered around 20 percent low-income people in the neighborhood, which is well below the mean (which falls at about 30 percent). Second, the clustering of dots is close to the diagonal, so there is little difference in outcomes. By contrast, Figure 5B, which shows the distribution of sibling pairs originating from Decile 10, presents a more scattered picture. There is still a tendency for clustering around the diagonal (at about 15 to 35 percent low-income people), but there are also examples of pairs where one of the pairs does well, whereas the other lives in a neighborhood with 50 to 60 percent low-income residents (which corresponds to two standard deviations above the mean). Additionally, we see more values higher up on the diagonal, which, although meaning little difference between siblings, provides support to findings from previous work about intergenerational transmissions of neighborhood status (see van Ham et al. 2014).

Discussion

In the introduction, we positioned this article within a long tradition of scholarly work by geographers on the influence of contextual or environmental factors on human behavior, practice, and experience (see Kwan 2018; Kwan and Schwanen 2018). We argued that one of the main challenges in this field of work is the measurement of spatial context using a spatiotemporal perspective, acknowledging that people are exposed to different spatial contexts over the course of their lives. Pearce (2018) used the life course of place approach to place contextual exposure and related spatial–temporal mobility into a life course framework. This article fits in this tradition in geography by analyzing the long-term neighborhood histories of adults after they have left

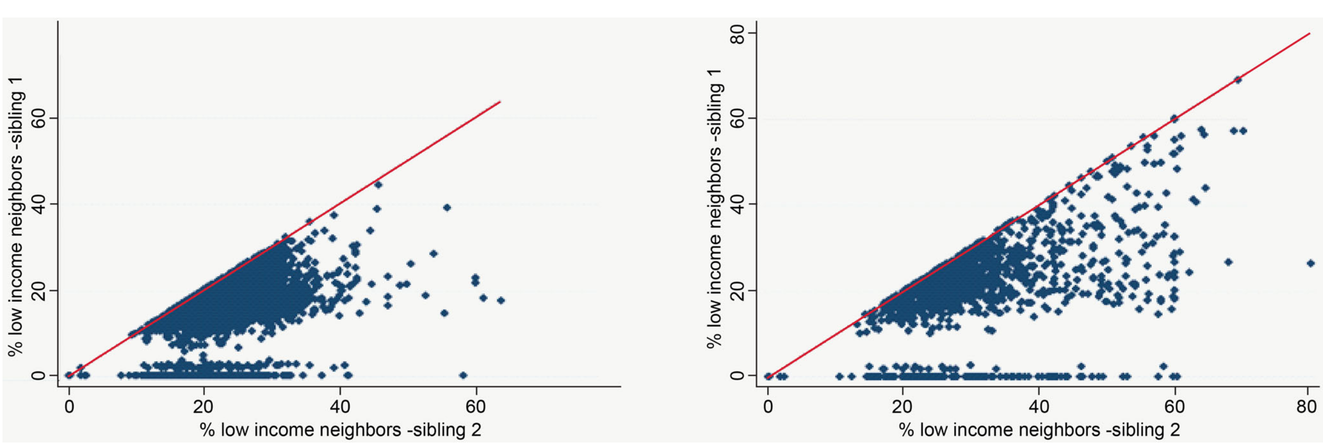

Figure 5. Graphs for (A) Decile 1 and (B) Decile 10, showing the relationship between siblings in terms of the share of low-income neighbors in the "best" neighborhood they reach during their independent housing career. The diagonal line represents zero difference between siblings.

the parental home. We are specifically interested in the effects on these neighborhood histories of the childhood family context and the childhood neighborhood. Using rich register data from Sweden, we employed a quasi-experimental family design exploiting sibling relationships (building on work such as Solon, Page, and Duncan 2000; Lindahl 2011; Nicoletti and Rabe 2013) to disentangle the effects of inherited disadvantage (socioeconomic position) and spatial disadvantage (the environmental context in which children grow up). We used two data sets, the first containing real siblings, so that we could explore the impact of home and neighborhood on later life residential careers, and the second including what we have called contextual siblings. The latter are individuals similar to real siblings, with the important difference of growing up in different households. This strategy enabled us to assess the impact of geography on trajectories later in life.

In exploring the effects of inherited and childhood spatial disadvantage on adult neighborhood trajectories of siblings (real and contextual), we developed three hypotheses. The first hypothesis stated that after controlling for family environment, the childhood neighborhood will continue to be a site of significant influence on later life neighborhood careers. There is clear evidence to confirm this. Even when we included an array of critical control variables both for the family and for the individual child, there was still an effect of the childhood neighborhood that extended beyond eight years after leaving the parental neighborhood. The second, explicitly geographical, hypothesis suggested that after controlling for family influences, the neighborhood contribution to understanding later in life neighborhood outcomes will be significantly reduced in comparison to models that only consider neighborhood. Again, we identified evidence that this was the case. Family influences are important and significantly contribute to later life residential outcomes. The third hypothesis proposed that the contribution that neighborhood and family environments make to later-in-life neighborhood outcomes will remain throughout later life but will attenuate over time. Our models show that the long arm of the family is indeed time delimited: The longer siblings have been away from the parental family home, the less similar are their residential trajectories. Over time, an individual's own preferences, preferences of his or her partner, and, for example, his or her own achievements in life and capabilities begin to play a much greater role in the outcome of a life course career.

Of course, a note of caution is required when interpreting the differences between the real and contextual pairs. The contextual pairs are based on random pairings of two similar and geographically colocated but unrelated individuals. The quality of the control group affects the outcomes of the comparisons between real and contextual siblings and therefore the conclusions of our analyses. Future research could work with different strategies to assemble a control group based on contextual siblings to assess the robustness of our findings. There are more complex methods available to construct control groups, but these will undoubtedly further reduce the size of the control group, which in this study was already small compared to the group of real siblings. Even with the potential limitation of the control group, however, we believe that this article shows that our approach has merit in separating family and neighborhood effects.

Overall, we find that both inherited and spatial disadvantage are important for the reproduction of neighborhood inequalities between generations. The two modes of disadvantage inform each other and, as such, reinforce the outcomes experienced by children. Disadvantaged households often live in disadvantaged neighborhoods, and this "double whammy" of inequality leads to further difficulties for children in terms of disconnecting their own later life outcomes from their parental background. Although the impact of inherited and spatial disadvantage attenuates over time, the legacy is such that the "stickiness" (Glass and Bilal 2016) lasts for a long time, reducing opportunities for social and spatial mobility. Our findings are important for current debates in geography on the life course of place (Pearce 2018) and the spatial–temporal approach to understanding geographic context and its effects (Kwan 2018). We found long-term effects of geography on individual geographical context trajectories. Our findings also contribute to wider debates in geography on sociospatial patterns of inequalities in cities. Our results show that these inequalities are (re)produced by people through family structures but also that spatial inequalities reproduce themselves through geographical structures. This very much underpins the idea that space is not a neutral container but something that was both shaped by and itself shapes the processes and experiences of those within it (Lefebvre 1974).

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Notes

1. Income from work represents the sum of cash salary payments, income from active businesses, and tax-based benefits that employees accrue as terms of their employment (sick or parental leave, work-related injury or illness compensation, daily payments for temporary military service, or giving assistance to a handicapped relative).
2. The cut point has been used previously in studies of neighborhood careers and neighborhood effects (see van Ham et al. 2014; Hedman et al. 2015).
3. No definition of neighborhood is ever ideal, and there are problems with using the SAMS (see, e.g., Amcoff 2012). Adopting this pragmatic approach allows comparison between the findings in this work and previous work using the Swedish data and the SAMS.
4. We also explored including the presence of children, but the variable did not add anything to the models and was omitted.
5. At the time of writing, 100 SEK was equivalent to US$11.
6. A tenant-owned cooperative could be regarded as falling between owning and renting, where the real estate is owned by a tenant association but the rights to occupy a dwelling are bought and sold on the market. Prices can be high in popular areas and cities but below the cost of outright ownership.
7. It is relatively common to have one parent born in Sweden and one parent born in another Western (often Nordic) country. Most of these individuals (97 percent) are born in Sweden.
8. This is likely a product of the income classification, which is based on the national income distribution of the entire working-age population, including females and young adults.

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References

Allison, P. D. 2009. *Fixed effects regression models*. Vol. 160. London: Sage.

Amcoff, J. 2012. Hur fungerar SAMS-områdena i studier av grannskapseffekter? En studie av SAMS-områdenas homogenitet [How do SAMS areas work in neighborhood impact studies? A study Q13 of the SAMS area homogeneity]. *SocialvetenskapligTidskrift* 19:93–115.

Bailey, A. J. 2009. Population geography: Lifecourse matters. *Progress in Human Geography* 33 (3):407–18. doi: 10.1177/0309132508096355.

Bauer, P., and R. T. Riphahn. 2006. Timing of school tracking as a determinant of intergenerational transmission of education. *Economics Letters* 91 (1):90–97. doi: 10.1016/j.econlet.2005.11.003.

Black, S. E., and P. J. Devereux. 2010. Recent developments in intergenerational mobility. Report No. w15889. Cambridge, MA: National Bureau of Economic Research.

Coulter, R., M. van Ham, and A. Findlay. 2016. Rethinking residential mobility: Linking lives through time and space. *Progress in Human Geography* 40 (3):352–74. doi: 10.1177/0309132515575417.

d'Addio, A. C. 2007. Intergenerational transmission of disadvantage: Mobility or immobility across generations. OECD Social, Employment and Migration Working Papers No. 52, Organization for Economic Cooperation and Development, Paris.

Davis, O. S., C. M. A. Haworth, C. M. Lewis, and R. Plomin. 2012. Visual analysis of geocoded twin data puts nature and nurture on the map. *Molecular Psychiatry* 17 (9):867–74. doi: 10.1038/mp.2012.68.

De Nardi, M. 2004. Wealth inequality and intergenerational links. *The Review of Economic Studies* 71 (3):743–68. doi: 10.1111/j.1467-937X.2004.00302.x.

De Vuijst, E., M. van Ham, and R. Kleinhans. 2016. A life course approach to understanding neighbourhood effects. IZA Working Paper 10276, IZA, Bonn, Germany.

De Vuijst, E., M. van Ham, and R. Kleinhans. 2017. The moderating effect of higher education on the intergenerational transmission of residing in poverty neighbourhoods. *Environment and Planning A* 49 (9):2135–54. doi: 10.1177/0308518X17715638.

Elwood, S., V. Lawson, and S. Nowak. 2015. Middle-class poverty politics: Making place, making people. *Annals of the Association of American Geographers* 105 (1):123–43. doi: 10.1080/00045608.2014.968945.

Galster, G., and P. Sharkey. 2017. Spatial foundations of inequality: A conceptual model and empirical overview. *RSF: The Russell Sage Foundation. Journal of the Social Sciences* 3 (2):1–33.

Glass, T. A., and U. Bilal. 2016. Are neighborhoods causal? Complications arising from the "stickiness" of ZNA. *Social Science & Medicine* 166:244–53. doi: 10.1016/j.socscimed.2016.01.001.

Gustafson, B., K. Katz, and T. Österberg. 2016. Residential segregation from generation to generation: Intergenerational association in socio-spatial context among visible minorities and the majority population in metropolitan Sweden. *Population Space and Place* 24 (3). doi: 10.1002/psp.2028.

Hauser, R. M. 1998. *Intergenerational economic mobility in the United States: Measures, differentials and trends*. Madison: Center for Demography and Ecology, University of Wisconsin–Madison.

Hedman, L., and R. Andersson. 2015. Etnisk segregation och inkomstsegregation i Sveriges tio största arbetsmarknadsregioner 1990–2010. In *Mångfaldens Dilemma: Boendesegregation och Områdespolitik*, ed. R. Andersson, B. Bengtsson, and G. Myrberg, 15–38. Malmö, Sweden: Gleerups.

Hedman, L., D. Manley, M. van Ham, and J. Östh. 2015. Cumulative exposure to disadvantage and the intergenerational transmission of neighbourhood effects. *Journal of Economic Geography* 15 (1):195–215. doi: 10.1093/jeg/lbt042.

Hedman, L., M. van Ham, and T. Tammaru. 2017. Three generations of intergenerational transmission of neighbourhood context. IZA Discussion Paper No. 11218, IZA, Institute of Labor Economics, Bonn.

Jacobs, J. M. 2012. Urban geographies I: Still thinking cities relationally. *Progress in Human Geography* 36 (3):412–22. doi: 10.1177/0309132511421715.

Jones, A. 2014. Geographies of production I: Relationality revisited and the "practice shift" in economic geography. *Progress in Human Geography* 38 (4):605–15. doi: 10.1177/0309132513502151.

Katz, L. F., J. R. Kling, and J. B. Liebman. 2000. Moving to opportunity in Boston: Early results of a randomized mobility experiment. NBER Working Paper No. w7973, National Bureau of Economic Research, Cambridge, MA.

Kleinepier, T., and M. van Ham. 2017. The temporal stability of children's neighborhood experiences: A follow-up from birth to age 15. *Demographic Research* 36 (59):1813–26. doi: 10.4054/DemRes.2017.36.59.

Kleinepier, T., M. van Ham, and J. Nieuwenhuis. 2018. Ethnic differences in timing and duration of exposure to neighborhood disadvantage during childhood. *Advances in Life Course Research* 36:92–104. doi: 10.1016/j.alcr.2018.04.003.

Kukk, K., M. van Ham, and T. Tammaru. 2019. EthniCity of leisure: A domains approach to ethnic integration during free time activities. *Tijdschrift voor Economische en Sociale Geografie* 110 (3):289–302. doi: 10.1111/tesg.12307.

Kwan, M.-P. 2018. The limits of the neighborhood effect: Contextual uncertainties in geographic, environmental health, and social science research. *Annals of the American Association of Geographers* 108 (6):1482–90. doi: 10.1080/24694452.2018.1453777.

Kwan, M.-P., and T. Schwanen. 2018. Context and uncertainty in geography and GIScience: Advances in theory, method, and practice. *Annals of the American Association of Geographers* 108 (6):1473–75. doi: 10.1080/24694452.2018.1457910.

Lefebvre, H. 1974. *La production de l'espace* [The production of space]. Paris: Éditions Anthropos.

Lindahl, L. 2011. A comparison of family and neighborhood effects on grades, test scores, educational attainment and income—Evidence from Sweden. *The Journal of Economic Inequality* 9 (2):207–26. doi: 10.1007/s10888-010-9144-1.

Mason, J. 2004. Personal narratives, relational selves: Residential histories in the living and telling. *The Sociological Review* 52 (2):162–79. doi: 10.1111/j.1467-954X.2004.00463.x.

Mayer, S. E., and L. M. Lopoo. 2005. Has the intergenerational transmission of economic status changed? *Journal of Human Resources* 40 (1):169–85. doi: 10.3368/jhr.XL.1.169.

Merlo, J., H. Ohlsson, B. Chaix, P. Lichtenstein, I. Kawachi, and S. V. Subramanian. 2013. Revisiting causal neighborhood effects on individual ischemic heart disease risk: A quasi-experimental multilevel analysis among Swedish siblings. *Social Science & Medicine* 76:39–46. doi: 10.1016/j.socscimed.2012.08.034.

Morris, T., D. Manley, and C. E. Sabel. 2018. Residential mobility: Towards progress in mobility health research. *Progress in Human Geography* 42 (1):112–33. doi: 10.1177/0309132516649454.

Nicoletti, C., and B. Rabe. 2013. Inequality in pupils' test scores: How much do family, sibling type and neighbourhood matter? *Economica* 80 (318):197–218. doi: 10.1111/ecca.12010.

OECD Inequality Update. 2016. *Income inequality remains high in the face of weak recovery*. Paris: Organization for Economic Cooperation and Development.

Oreopoulos, P. 2003. The long-run consequences of living in a poor neighborhood. *The Quarterly Journal of Economics* 118 (4):1533–75. doi: 10.1162/003355303322552865.

Pearce, J. R. 2018. Complexity and uncertainty in geography of health research: Incorporating life-course perspectives. *Annals of the American Association of Geographers* 108 (6):1491–98. doi: 10.1080/24694452.2017.1416280.

Raab, M., A. E. Fasang, A. Karhula, and J. Erola. 2014. Sibling similarity in family formation. *Demography* 51 (6):2127–54. doi: 10.1007/s13524-014-0341-6.

Sharkey, P. 2013. *Stuck in place: Urban neighborhoods and the end of progress toward racial equality*. Chicago: University of Chicago Press.

Small, M. L., and J. Feldman, 2012. Ethnographic evidence, heterogeneity, and neighbourhood effects after moving to opportunity. In *Neighbourhood effects research: New perspectives*, ed. M. van Ham, D. Manley, N. Bailey, L. Simpson, and D. Maclennan, 57–77. Dordrecht, The Netherlands: Springer.

Solon, G. 1999. Intergenerational mobility in the labor market. In *Handbook of labor economics*, ed. O. Ashenfelter and D. Card, vol. 3, 1761–800. San Diego, CA: Elsevier.

Solon, G., M. E. Page, and G. J. Duncan. 2000. Correlation between neighboring children in their subsequent educational attainment. *The Review of Economics and Statistics* 82 (3):383–92. doi: 10.1162/003465300558885.

Sunley, P. 2009. Relational economic geography: A partial understanding or a new paradigm? *Economic Geography* 84 (1):1–26. doi: 10.1111/j.1944-8287.2008.tb00389.x.

Tammaru, T., S. Marcinczak, M. van Ham, and S. Musterd, eds. 2016. *East meets West: New perspectives on socio-economic segregation in European capital cities*. London and New York: Routledge.

van Ham, M., L. Hedman, D. Manley, R. Coulter, and J. Östh. 2014. Intergenerational transmission of neighbourhood poverty: An analysis of neighbourhood histories of individuals. *Transactions of the Institute of British Geographers* 39 (3):402–17. doi: 10.1111/tran.12040.

van Ham, M., D. Manley, N. Bailey, L. Simpson, and D. Maclennan. 2012. Neighbourhood effects research: New perspectives. In *Neighbourhood effects research: New perspectives*, 1–21. Dordrecht, The Netherlands: Springer.

van Ham, M., D. Manley, N. Bailey, L. Simpson, and D. Maclennan, eds. 2013. *Understanding neighbourhood dynamics: New insights for neighbourhood effects*. Dordrecht, The Netherlands: Springer.

van Ham, M., and T. Tammaru. 2016. New perspectives on ethnic segregation over time and space: A domains approach. *Urban Geography* 37 (7):953–62. doi: 10.1080/02723638.2016.1142152.

Vartanian, T. P., and P. W. Buck. 2005. Childhood and adolescent neighborhood effects on adult income: Using siblings to examine differences in ordinary least squares and fixed-effect models. *Social Service Review* 79 (1):60–94. doi: 10.1086/426718.

Vartanian, T. P., P. W. Buck, and P. Gleason. 2007. Intergenerational neighborhood-type mobility: Examining differences between blacks and whites. *Housing Studies* 22 (5):833–56. doi: 10.1080/02673030701474792.

Vollebergh, W. A. M., J. Iedema, and Q. A. W. Raaijmakers. 2001. Intergenerational transmission and the formation of cultural orientations in adolescence and young adulthood. *Journal of Marriage and Family* 63 (4):1185–98. doi: 10.1111/j.1741-3737.2001.01185.x.

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