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ABSTRACT

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Longer term exposure to high poverty neighbourhoods can affect individual socio-economic outcomes later in life. Previous research has shown strong path dependence in individual neighbourhood histories. A growing literature shows that the neighbourhood histories of people is linked to the neighbourhoods of their childhood and parental characteristics. To better understand intergenerational transmission of living in deprived neighbourhoods it is important to distinguish between inherited disadvantage (socio-economic position) and contextual disadvantage (environmental context in which children grow up). The objective of this paper is to come to a better understanding of the effects of inherited and contextual disadvantage on the neighbourhood careers of children once they have left the parental home. We use a quasi-experimental family design exploiting sibling relationships, including real sibling pairs, and "synthetic siblings" who are used as a control group. Using rich register data from Sweden we find that real siblings live more similar lives in terms of neighbourhood experiences during their independent residential career than synthetic sibling pairs. This difference reduces over time. Real siblings are still less different than synthetic pairs but the difference gets smaller with time, indicating a quicker attenuation of the family effect on residential outcomes than the neighbourhood effect.

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Introduction

An increasing body of literature suggests that growing up in a poor neighbourhood has a negative effect on adolescent and adult socio-economic outcomes (see van Ham et al., 2012 for an overview). Recent research also shows that growing up in disadvantaged neighbourhoods increases the likelihood of living in a similarly deprived neighbourhood later in life and hence can lead to the reproduction of individual disadvantage over multiple generations. Using data from Sweden, van Ham and colleagues (2014) concluded that, for individuals who grew up in poor neighbourhoods, their independent housing career was more likely to involve prolonged stays in neighbourhoods with greater poverty compared to those who had grown up in relative affluence (see also Gustafson et al., 2016). Sharkey (2008; 2013) found similar outcomes using data from the US. This 'inheritance' of disadvantage is of substantial interest to academics, policy makers and governments alike (see recent reports including OECD, 2016).

The fact that the family and neighbourhood contexts into which an individual is born has a lasting imprint on their later life presents a major societal challenge with respect to ensuring equality of opportunity and the efficient utilisation of educational and individual resources within society. However, Sharkey (2013) also identified a secondary effect whereby if a child's parent had also grown up in poverty then that child's outcomes were less favourable compared to a child with a parent who had not grown up in poverty. This was even the case when the current neighbourhood of residence was relatively affluent. The link between deprivation in the previous generation and current disadvantage suggests that there are multiple intertwined routes through which the circumstances in which a child grows up may impact the spatial outcomes of their later life. In this paper we identify two of these routes which we term as inherited disadvantage and contextual disadvantage.

We define *inherited disadvantage* as disadvantage which is transmitted from parents to their children. It is a broad concept, which includes educational (Black et al., 2003; Bauer & Riphahn, 2006) and economic (Solon 1999) achievement, but also cultural approaches and experiences (Vollebergh et al., 2001; Dohmen et al., 2011). An extensive literature has analysed intergenerational socio-economic transmissions and documented strong correlations between especially parents' and children's educational and income levels (see Solon, 1999; d'Addio, 2007; Black & Deveraux, 2010 for overviews). We define *contextual disadvantage* as the experiences that a child gains directly through the interactions in spaces beyond the household. Whilst there are many potential spaces, such as schools, activity clubs, and friends, most literature focusses on the residential neighbourhood environment where children grow up (van Ham and Tammaru, 2017). Moreover, the long arm of the neighbourhood – the impact of the residential neighbourhood on other life domains – is not restricted to the immediate locale but also the school that a child goes to, and the leisure sites they can visit, simply because some neighbourhoods are better connected and resourced than others. Thus, often the residential neighbourhood can act as a proxy for many of the other contexts as well.

To separate between inherited and contextual disadvantage has become a major objective for the literature on intergenerational socio-economic mobility (Black & Deveraux, 2011). The issue is less well developed in the literature dealing with the intergenerational transmission of living in deprived neighbourhoods, but it is just as pressing. Intergenerational patterns of neighbourhood disadvantage, where children remain in a similarly deprived residential context as their parents and potentially also previous generations (see Hedman et al., 2017), is most

likely the result of a combination of parental "influence", including the transmission of (housing) norms, economic resources, opportunities for social mobility etc., and an effect of the context in which the child grows up.

The objective of this paper is to come to a better understanding of the effects of inherited and contextual disadvantage on the neighbourhood careers of children once they have left the parental home. We use a methodological approach from the literature on intergenerational socio-economic mobility, which involves a quasi-experimental family design exploiting sibling relationships (examples of studies include Solon et al., 2000; Lindahl, 2011; Nicoletti & Rabe, 2013). If sufficiently close in age, full siblings[1] can be assumed to share both inherited and contextual disadvantages (or equally advantages). In contrast, unrelated individuals who have grown up in the same neighbourhood but not in the same household only share the experienced context. These "synthetic siblings" can then be used as a "control group" to separate the two sources of influence and enable comparisons. We are especially interested in the interactions between the effects of inherited and contextual disadvantages. We use rich register data from Sweden which allows us to follow a large group of siblings (born within three years from each other) over 14 years of their independent housing career after they leave the parental home.

Literature Review

Inequalities within societies have generated substantial academic interest. While much research has been devoted to socio-economic inequalities, there has also been substantial interest in its spatial aspects. Underpinning this interest is the idea that living in a deprived neighbourhood is the result not only of having a low income (as well as preferences and other forms of restrictions, see van Ham et al., 2013), but also that living in such an environment can also have an independent causal effect on individual outcomes (income included), the so-called neighbourhood effects. The vast bulk of research on neighbourhood selection and neighbourhood effects makes use of point-in-time measures of neighbourhood characteristics. But recently there have been calls for not only using a longer time perspective (individual neighbourhood histories or biographies) but also to analyse spatial inequalities from the perspective of multiple generations (Sharkey, 2013; van Ham et al., 2014; Morris et al., 2016).

The intergenerational dimension of disadvantage is well developed in literatures on socio-economic 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 PSID data from the United States. They demonstrated that prior to 1953 the elasticity was increasing – in other words, a child's income was more heavily influenced by that of their parent's. Since 1953 this elasticity has decreased and as a result there has been, in the US, an increase in intergenerational mobility. In other words, your family background matters less and less as a determinant of your later life success, and individual characteristics become more important. This finding contrasts substantially with other studies, including that of Hauser (1998) who concluded that income mobility decreased in the same period thus

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[1] We distinguish between full siblings, siblings where both parents are shared, and partial siblings because only full siblings will share the breadth of experience, exposures and genetic composition required for the comparison we advance.

pointing to an increase in contextual and intergenerational transmission effects. Moving beyond income, Nardi (2004) documents inequality in wealth and demonstrates that the concentration of wealth is greater than that of the intergenerational transmission of income achievement over generations. However, Nardi also highlights that wealth within a single generation does not necessarily transmit to automatic wealth in future generations: the persistence of wealth requires the specific intervention of bequests designed to protect wealth while voluntary bequests do not result in the same intergenerational inequalities.

There is, however, a diverse set of other outcomes not treated by this literature through which intergenerational transmissions may occur and which may also influence the wellbeing and development of children, especially in their later life. For instance, intergenerational transmission of neighbourhood context, or spatial inheritances. Research has repeatedly shown a path dependence between childhood neighbourhoods and neighbourhood experiences later in life (Kleinepier & van Ham, 2017a,b). These intergenerational transmissions of neighbourhood are important to understanding the reproduction and concertation of disadvantage. In the US, Sharkey (2013) demonstrated that children who grew up in poorer neighbourhoods were, all other things being equal, more likely themselves to live in a poorer neighbourhood later in life. This reinforces the transmission of inequalities as children experience the same spatial opportunity structures (see Galster and Sharkey, 2017) that their parents did with the consequence that the abilities of these children to gain social mobility was reduced (see also Vartanian et al., 2007). Turning to the European experience, van Ham et al., (2014) demonstrated that, even in a strong welfare state country such as the Sweden, where inequalities are substantially lower than in the US, similar intergenerational transmissions of place occurred (see for confirmation Gustafson et al., 2016). Recently, de Vuijst and colleagues (2017) demonstrated similar findings using Dutch population register data. These findings suggest that in order to understand who is living in the most deprived neighbourhoods and the extent of individual exposure to such neighbourhoods we must take into account childhood environments, as well as other parental resources to our explanatory frameworks which too often are restricted to short-term individual-level characteristics.

Socio-economic status is important when analysing neighbourhood careers (Hedman et al., 2011) but it is not the only relevant factor. Entry into and departure from neighbourhoods is highly structured and primarily a function of the interactions between financial resources (Hedman et al., 2011), neighbourhood desires and preferences (Feijten & van Ham, 2008) along with notions of homophily and desires to live amongst people with similar backgrounds (McPherson et al., 2001). Both more general preferences and desires related to homophily could be put within an intergenerational framework. For example, socialization perspectives have been put forward as one important hypothetical explanation to intergenerational similarities in housing tenure (Helderman & Mulder, 2007) and residential environments (like countryside, suburb or city center, Feijten et al., 2008). Such socialization could occur both within the family and within the local neighbourhood. To some extent, it may be regarded as a product of both since the childhood neighbourhood indeed is the result of family resources and preferences. However, the intergenerational perspective is relatively absent also in the residential mobility literature. Whereas arguments about the necessity of a life course perspective are common (Coulter et al., 2016), they rarely seem to include childhood experiences but rather focus on the timing of life course events in adulthood. Similarly, studies of housing careers tend to zoom in on adulthood residential environments and leave earlier

experiences, as well as those of previous generations, out (Kendig, 1984; Bailey & Livingstone, 2008).

The above discussion suggests that the future of children is shaped by both family and neighbourhood contexts. This is not a new idea – the discussion of the relative importance of nature versus nurture is an on-going one in literatures concerned with intergenerational transmission. It has also been empirically tested with several studies aiming to differentiate between the relative importance of family versus (childhood) neighbourhood for later-in-life socio-economic outcomes. These studies generally show that the family context is the most important (see Black & Deveraux 2010 for an overview). Indeed, some studies, such as Lindahl (2011) and Oreopoulos (2003), find neighbourhood effects close to zero, suggesting that the impact of the (childhood) residential environment for future socio-economic status is almost non-existent. The discussion of the relative importance of inherited versus contextual disadvantage has not yet made its way, at least not as far as we are aware, into the literatures on neighbourhood selection, housing careers and transmission of neighbourhood status across generations.

Establishing a true causal relationship between outcomes of children their parents and their neighbourhood context is a major challenge in the social science literature. Ideally an experimental design is used, however, with the exception of the quasi experimental settings in the United States with the Gautreaux, Moving to Opportunity and HOPE VI programs (Katz et al., 2000) such settings are rare in the social sciences. The quasi experimental setting relies on being able to randomly assign individuals (or households) to treatment groups, an approach that is not regularly possible in observational studies. However, an alternative to random assignment is available in households with siblings. Here we can study outcomes for pairs of individuals who are sharing residential and family contexts, while controlling for many of the unobserved biases. For instance, Raab and colleagues (2014) used sibling pairs to understand how early childhood and family structure accounted for later life family formation whilst Merlo and colleagues (2017) used a similar data design to investigate the linkage between ischemic heart disease and neighbourhood context. Within the epidemiological literature, Davies and colleagues (2012) used geocoded twin data to explore the relative impacts of nature and nurture relative to where children grow up. Finally, within the economic literature, Vartanian and Buck (2005) used siblings to examine the impact of neighbourhood context on adult earnings. This paper also uses sibling pairs to better understand the role of inherited and contextual disadvantage on later life neighbourhood outcomes. We will use both real full siblings and "synthetic siblings" - unrelated individuals who have grown up in the same neighbourhood but not in the same household and therefore only share the experienced context. These "synthetic siblings" can be used as a "control group" to separate the effects of inherited and contextual disadvantages. We seek to identify the relative importance of the neighbourhood 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 may occur. To guide the analysis, we present three research questions: Firstly, we investigate if children who grow up in the same neighbourhood environment have similar post childhood trajectories of neighbourhood 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 neighbourhood will continue to be a site of significant influence on later life neighbourhood careers.

The second research question relates to the problem of multiple contexts that could influence individual outcomes. So far, the literature has not isolated the relative contributions of the family compared to the neighbourhood and as a result we cannot make any statements about the relative contributions of inherited or experienced inequality. In line with findings from the socio-economic 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 neighbourhood contribution to understanding late in life neighbourhood outcomes will be significantly reduced in comparison to models that only consider childhood neighbourhood.

The effects of the family context should become visible when comparing real siblings – who share family and neighbourhood context – with synthetic siblings, who only share the neighbourhood context. The differences in outcomes between these two groups should shed some light on the effects of the family context on neighbourhood trajectories later in life.

Hypothesis 3: the contribution that neighbourhood and family environments make to later in life neighbourhood outcomes will remain throughout later life but will attenuate over time.

In other words, there is a 'long arm of the home' present in both the family and place of residence effects that contribute to later life outcomes. Previous work has shown that there is a lasting impact of neighbourhood and familial environment (Glass & Bilal, 2016). We expect to identify similar long-lasting effects with siblings individual residential careers, such that whilst the influence may decline over time we expect that it will still be critical in understanding the residential trajectories of the individuals.

Data and methods

In order to distinguish the relative impact of family versus neighbourhood, or inherited versus contextual level of disadvantage, we use a quasi-experimental family design that includes siblings. The sibling design requires two subsets of data. The first subset consists of pairs of individuals identified as full siblings (who share mother *and* father). Full siblings share a substantial part of their genetic background and if born sufficiently close in time, they can be assumed to have been raised in similar circumstances and been exposed to similar norms and values. In addition, they will have been exposed to the same neighbourhood environment at similar life stages (although peers and specific interaction details are likely to differ). Hence, siblings share critical family *and* experienced contexts that we expect to affect their future neighbourhood careers. The second subset is composed of a control group of individuals sharing the so-called experienced features (they lived in the same neighbourhoods) but who are unrelated and consequently have different inherited features. The use of the control group allows us to identify the relative contribution of the experienced context and the family context on neighbourhood outcomes later in life.

The data used for this study are derived from GeoSweden, a longitudinal micro-database owned by the Institute for Housing and Urban Research, Uppsala University, which contains the entire Swedish population from 1990 to 2010. The database is constructed annually from a number of different annual administrative registers including, demographic, geographic, socio-economic and real estate data for each individual living in Sweden. Each individual is assigned an anonymous identification number, making it possible to link registers and follow people over time. For each person in the dataset, we also have the (biological or adoptive) mother's and father's identification number which enables us to identify siblings on either the mother's or the father's side, and to access all information about parents.

We wish to follow the siblings' independent housing paths for as many years possible, but we also need information on the neighbourhood environment they experienced whilst living with their parents. Thus, we only select individuals who live with their parents at the start of our follow-up period (1990) and for whom we have consecutive data for the full period of measurement. When selecting individuals for our full sibling sample we have employed the following selection criteria: i) both siblings are in the age range 15-21 in 1990 (corresponding to the first year for which we have data); ii) the siblings are born no more than three years apart; iii) the siblings lived in the parental home in 1990; iv) at least one sibling leaves the parental home between 1991 and 1993; v) the other sibling leaves the parental home no more than 4 years after the first sibling. These age and time restrictions ensure that our siblings had similar neighbourhood experiences during their childhood. The parental home could be either the mother's or the father's home, as long as both siblings live in the same home (when both live with their parent(s)). We have chosen to only compare two siblings within each family. In case of multiple sibling pairs within the same family that fulfil the above criteria, we have selected the sibling pair closest in age. If there are several potential sibling pairs of the same age range, we have selected pairs according to: 1) data availability, 2) same gender; 3) age, where we have kept the oldest pair. After these restrictions, we have ended up with a dataset containing 49,074 sibling pairs, or 98,148 individuals. Each individual in the data is followed for a consecutive 14-year period[2].

Key to our study is the need to separate out the relative contributions of the household (and family) in which an individual grows up from that of the context in which that household is set – the neighbourhood. In order to do so we need a control sample or people who do not share the family context, but who lived in the same neighbourhood. Thus, our control sample of, what we term, "synthetic sibling pairs", share childhood neighbourhood experiences but are completely unrelated and therefore do not share the same family, household or genetic inheritances (on either mother's or father's side) as the full siblings. However, we do want them to have a similar type of family background, to ensure that differences in neighbourhood 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 low, mid or high income earner) (both variables are described in more detail below). Synthetic pairs are created by selecting all individuals in the correct age range (15-21 in 1990) and shuffling them randomly by neighbourhood of origin, father's country background and income level. We then subject the synthetic pairs to the same restrictions as our real siblings and keep only the pairs who fulfil

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[2] 14 years if the maximum we can follow all individuals, since the last home-leavers move out of their parental home in 1997 (1993 for the first sibling, plus a four-year delay for the second sibling).

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; 3) they should leave home a maximum four years apart. After deletion of any genetically related pairs, we are left with a set of 5,177 synthetic sibling pairs for which sufficient data is available.

The sibling *pairs*, real and synthetic, 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 is also measuring difference, in this case difference in residential neighbourhood status: How different are siblings in terms of neighbourhood status after having left the parental home? Are they less different than non-siblings? And how does that vary by neighbourhood socio-economic status? Neighbourhood status can be conceptualised in many different 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 neighbourhood. 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 20 years (while for example ethnic segregation is relatively stable over time) and Swedish society is marked by increasing income polarization (Hedman & Andersson, 2015). Our definition of neighbourhood status uses the share of low-income individuals within the neighbourhood from the working-age population (so between 20 and 64 years). A low-income individual is defined as a person whose income from work, including work-related benefits[3], belongs to the three lowest deciles among the national income distribution[4]. Finally, while there are many different ways in which the spatial neighbourhood can be operationalised we define them pragmatically using SAMS (Small Area Market Statistics) areas. The SAMS classifications scheme is made by Statistics Sweden in collaboration with each respective municipality in order 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.

There are multiple approaches that we could adopt to model how neighbourhood status after leaving the parental home is affected by family and neighbourhood background during childhood respectively over the time period covered by the panel data. One approach often used in the literature is a fixed effects model. This effectively allows individuals to be their own control by only investigating within individual change providing a means of overcoming problems of endogeneity. One of the main features of the fixed effects model is that it keeps all time-invariant control variables "fixed" and so in practice these characteristics are controlled for (assuming there are no time invariant omitted variables) but there cannot be any estimates produced beyond a common error term. Often the literature accepts this limitation because the advantage of the approach is that it enables the unobserved characteristics, which may impact the results, to be assumed as unchanging and therefore the outcomes of the model

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[3]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).

[4] The cutpoint has been used previously in studies of neighbourhood careers and neighbourhood effects, see van ham and colleagues (2015) and Hedman and colleagues (2015) A lower cutpoint is not possible due to the large share with zero work income.

are less likely to be biased. However, whilst this may be an important feature for causal inference it is not necessarily desirable with respect to the outcomes that are being studied. The inclusion of fixed parameters for individuals effectively means that there is no pooling of information – individuals are their own controls – and an underlying assumption therefore has to be that there is no commonality between observations. In other words the individuals are assumed to be context independent. This means that there is an explicit assumption that geography (and therefore the neighbourhood) does not matter. Moreover, in this study, we want to investigate the impact of the neighbourhood and household in which an individual grows up – both fixed characteristics. Also, the most important independent variable – the type of "sibling" pair (full or synthetic) – is such a fixed characteristic and would fall out of a fixed effects model. As a solution to obtain estimates for such time-invariant characteristics we use an alternative approach known as the hybrid model (or Mundlak correction, see Mundlak, 1978) which deploys both the fixed- and random effects models. See Hedman and colleagues (2015) for an example of an application of this model.

The independent variables in our models measure demographic, socio-economic and housing characteristics of the pairs, known to affect neighbourhood choices and residential mobility tendencies. Key demographic characteristics include gender, marital and partnership status, the presence or otherwise of children, and whether or not someone was a student. It should be noted that couples only can be identified in the data if they are either married or have joint children. This means that many cohabitants (a common form of living among young Swedes) are erroneously classified as singles[5]. Income is measured as income from work, including work-related benefits and is adjusted for inflation, and reported in units of 100 SEK[6]. Housing tenure is measured in three categories: home ownership, tenant-owned cooperative[7], and rental. Since all variables are based on the sibling pair, they are coded to encompass all possible combinations for the two siblings. For example, for gender variable includes the alternatives "both siblings are male", "both siblings are female" and "one is male and one is female". 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.

In addition, we included two independent variables derived from the characteristics of parents rather than the individuals themselves. Country of birth is measured on a parental level because we argue that having an immigrant background affects also the neighbourhood outcomes of second generation immigrants. Parents' country of birth is classified into four large regions: Sweden, other West, Eastern Europe incl. Russia, and Non-western countries. If parents are from different regions[8], we classify siblings based on the region of the mother. For synthetic sibling pairs, as highlighted previously, both individuals must have parents" from the same

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[5] We tried also including presence of children but the variable did not add anything to the models and was left out to avoid unnecessary complications.
[6] At the time of writing, 100SEK was equivalent to US$11.
[7] Tenant-owned cooperative could be regarded as a form of housing 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 fairly high, at least in popular areas and cities, but well below the cost of outright ownership.
[8] It is relatively common to have one parent born in Sweden and one parent born in another Western, generally Nordic, country. The vast majority of these individuals (97%) are born in Sweden. Other combinations are unusual.

region. The variable measuring parents' neighbourhood status aims to capture potential intergenerational effects. It is measured in the same way as childrens' neighbourhood status, i.e. as the share low-income people among the working age neighbourhood population. It is measured the year before the first sibling leaves the parental home, or in 1990 in case the first sibling has already left.

Results

As explained above, we compare neighbourhood outcomes for real and synthetic sibling pairs where we expect that both are path dependent on parental neighbourhood because within both types of sibling pairs they share neighbourhood histories. However, there is an additional effect for the real siblings as they also share family history, upbringing, parental background and genes. As a result, you would expect their neighbourhood histories to be more similar than the synthetic ones. Figure 1 shows mean difference (solid lines) in share low income neighbours between real (the line shaded black) and synthetic (grey) sibling pairs. The mean for real sibling pairs is slightly lower, as is mean + 1 standard deviation (dashed lines) showing that real siblings are overall less different than synthetic sibling pairs in terms of the status of the neighbourhood they consume after leaving the parental home. Figure 1 also shows that the difference in neighbourhood status between siblings is quite stable over time (about ten percentage points) with slightly more variation during the early years after leaving the parental home. This is expected because in these early years moves will vary substantially depending on whether or not individuals continue in higher education, enter the labour market and whether they are pursuing solo or couple or partner residential careers. The difference between real and synthetic sibling pairs also appears to be relatively stable over time, albeit being a little larger during the early years. This initial evidence suggests that parental background is important in the early years but wears off over time.

Figure 1. Difference in share low income neighbours between siblings, synthetic and real sibling pairs. Figure show mean difference and mean + 1 standard deviation.
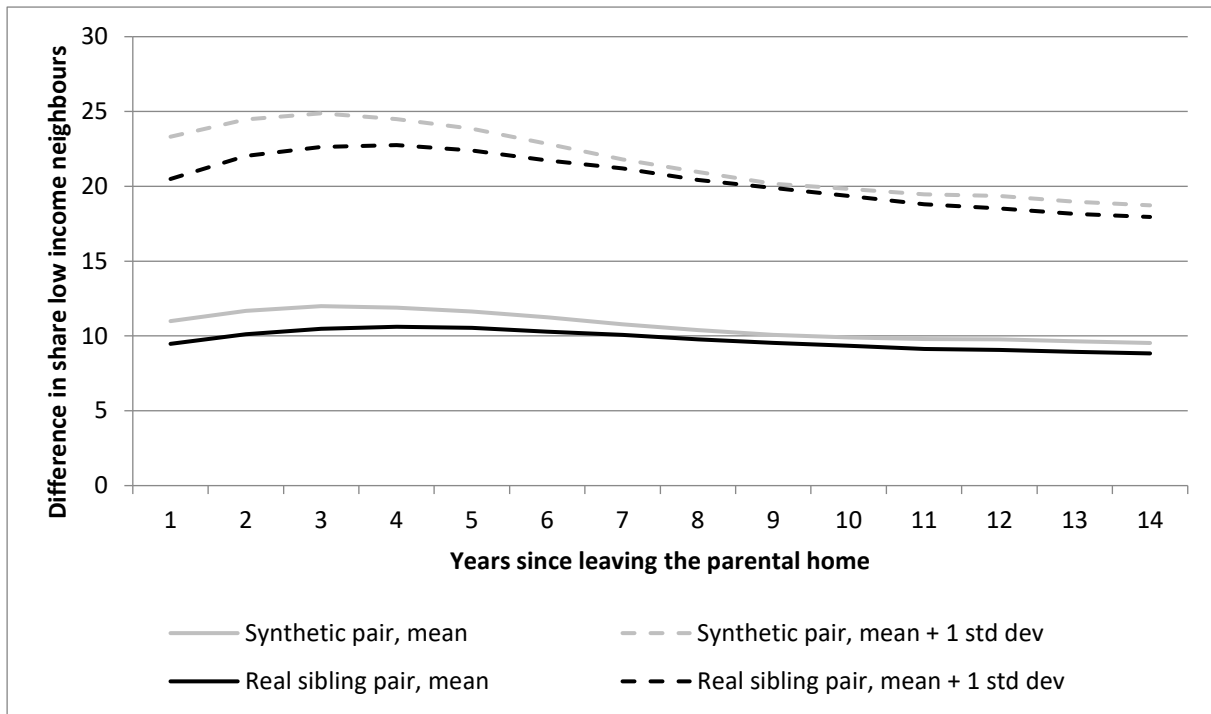
Figures 2 and 3 shows the mean difference between sibling pairs for real (figure 2) and synthetic (figure 3) sibling pairs, split by type of neighbourhood in which they lived in before leaving the parental home. The share of low income neighbours for the parental home has been split into deciles each year where decile 1 represents neighbourhoods with the lowest share of poor neighbours, and decile 10 neighbourhoods with the highest share of poor neighbours. For presentation purposes, and since variation is fairly low, we have chosen to show the mid neighbourhoods deciles 3-8 jointly. Both graphs (2 and 3) clearly show that the difference in neighbourhood status between siblings is fairly similar regardless of parental decile, with the exception of decile 10. Siblings growing up in the poorest neighbourhoods differ more later in life and this is valid for both real and synthetic sibling pairs. A probable conclusion is that some children from these neighbourhoods, including some children within the same family, do relatively well whereas some remain in the poorest areas also as adults. It might be less probable that children who grow up in wealthier neighbourhoods end up in the poorest neighbourhoods later in life. Comparing figures 2 and 3, we can however draw the same conclusion as previously, namely that the difference between real siblings (figure 2) is somewhat smaller than for synthetic sibling pairs (figure 3), for all parental neighbourhood deciles. However, the mean difference between real siblings from decile 9 is larger than the mean difference for synthetic pairs from deciles 1-8. Hence, parental background must be taken into account when analysing to what extent siblings live their lives in similar neighbourhoods.

Figure 2. Mean difference in share low income neighbourhood between *real siblings*, by parental neighbourhood low income share. (decile 1 = lowest (richest))
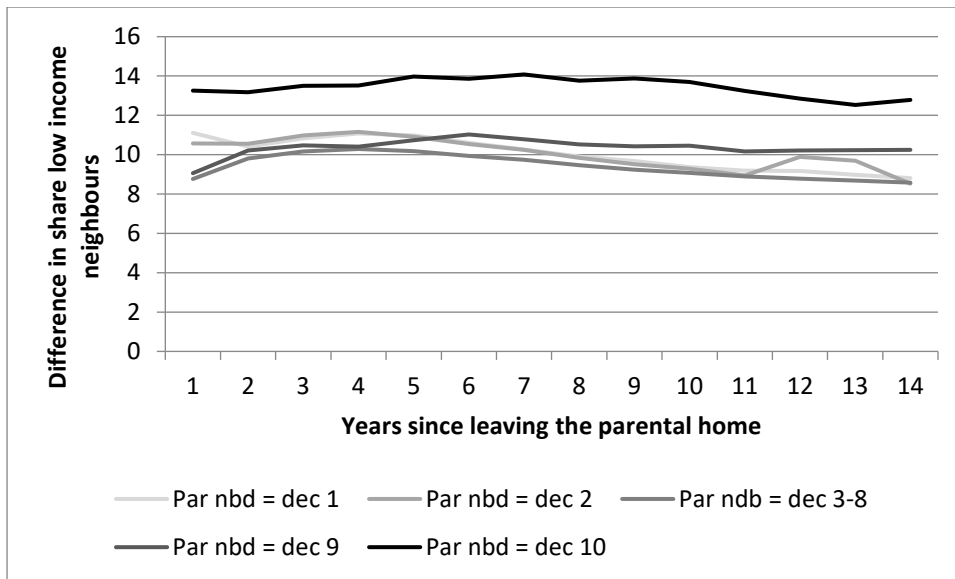
Figure 3. Mean difference in share low income neighbourhood between *synthetic siblings*, by parental neighbourhood low income share. (decile 1 = lowest (richest))
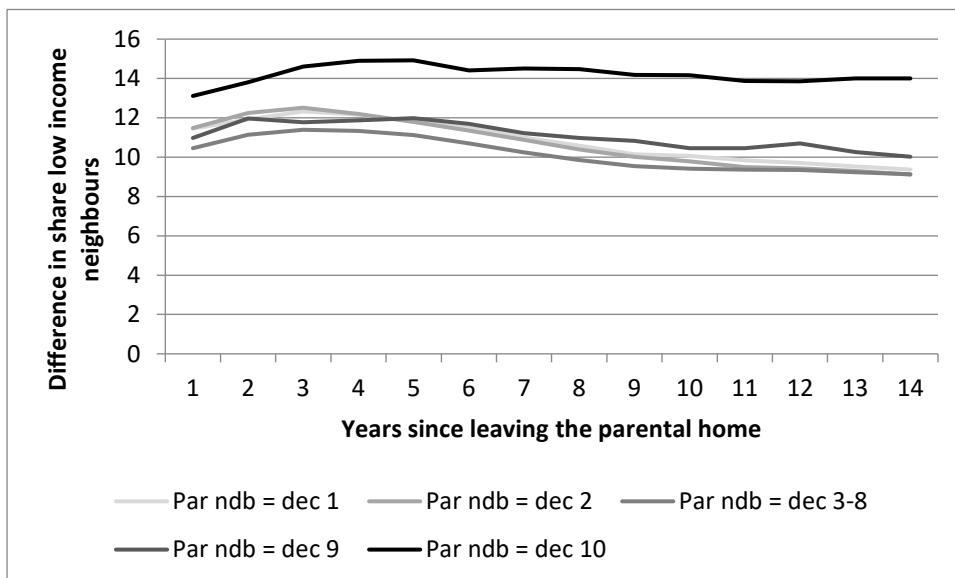
Table 1 shows descriptive statistics of all variables in the residential career model, by type of sibling pair. The most important message from the table is that the control group is very similar to the real sibling pairs, with three important exceptions. The first is age where real siblings are born further apart. A working hypothesis is that siblings closer in age live more similar lives, and this is why this difference in setup would make the synthetic pairs *less* different than the real pairs. The second exception refers to income where differences between the synthetic pairs are smaller, likely related to their smaller age differences. Again, this would suggest that the synthetic pairs are *less* different than real siblings, all else being equal. Finally, there is also a difference in municipality in which the siblings live during adulthood where real siblings are

much more likely to live in the same municipality, whether it is the parental one or not. However, although we hypothesize that geography can affect differences in neighbourhood 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, regardless of whether this is the original one or not, might be a "sibling effect".

Looking at the characteristics of the sibling pairs, they come from neighbourhoods with about 30% low income people. A majority of them come from native families and have high income fathers[9]. In their subsequent housing careers (table 1 shows descriptive statistics for all sibling pair-years), the synthetic sibling pairs live in neighbourhoods with on average about 10.5 percentage points difference in the share low income people, whereas the number for the real pairs is slightly. The sex distribution is even with about half of the pairs being dominated by one sex and the other half being mixed. The most common family type combinations are that both siblings are singles and that none has any children, but mixed pairs are also fairly common. Income differences are small on average. In a majority of the sibling pair-years, none in the pair is a student but one being a student is also common. Two siblings living in rental housing is the most common tenure combination, but it is almost as common that one of the siblings have moved into home ownership.

Table 1.Descriptive statistics, all years in data. Values in percent for categorical variables. Continuous variables in italics.

		Real siblings	Synthetic siblings
PARENTAL CHARACTERISTICS, ABSOLUTE VALUES			
Share low income neighbours in	*Mean*	*28,99*	*28,34*
parental neighbourhood	*Std Dev*	*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 levels 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	*Mean*	*9,07*	*10,45*
neighbours	*Std Dev*	*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

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[9] This 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.

	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	*Mean*	*1,63*	*0,88*
(100 SEK, money value of 1990)	*Std Dev*	*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 coop, one in ownership	8,80	9,66
	One in rental, one in ownership	18,90	21,49
Municipality	Same mun, parental one	38,77	31,39
	Same mun, not parental one	8,20	4,04
	Different municipalities	53,03	64,57
N (all years)		**687022**	**72478**
N (unique sibling pairs)		**49073**	**5177**

The descriptive statistics from both figures 1-3 and table 1 suggests that our real sibling pairs live more similar lives than our synthetic ones. If true, this could be interpreted as a "family effect". In order to test whether this perceived difference remains also after controlling for all background variables as listed in table 1, which all are likely to affect the relative difference in neighbourhood quality between siblings, we run a hybrid regression model.

Results from the hybrid model are presented in table 2. In the left-hand column of table 2, we present results of a joint model, including both our real and synthetic sibling pairs. The main aim of this model is to distinguish differences between the two groups. To further explore we interact the independent variables related to parental background with type of sibling pair to reveal how these background variables affect level of difference in neighbourhood status. The other independent variables are mainly used as control variables. They will be discussed in relation to the two other models of table 2 where differences between siblings are modelled separately for real and synthetic pairs.

The main conclusion from the joint model is that the tentative conclusion from the descriptive analysis can be confirmed, namely that real siblings indeed live more similar (i.e. less different) lives in terms of neighbourhood experiences than synthetic sibling pairs. The coefficient for difference between siblings for the real pairs is negative at approximately -1.8 (using synthetic pairs as the reference group), and highly significant, also when controlling for a range of background variables on both the parental and individual (pair) level. Given that both types of pairs share the same childhood neighbourhood environment, this is likely the result of a family effect. Returning to the original hypothesis as suggested in the introduction, the results suggest

that there are inherited disadvantages. We also find a clear year trend where the difference in neighbourhood quality between the pairs is reduced after 8 years from leaving the parental home. This is likely due to reaching a more stable position on the housing market where housing and neighbourhood environment represent a longer-term choice, and composition of not only an individual's choice but also the resolution of their own household requirements and preferences, rather than a temporary solution which would be represented by the transition year immediate after leaving the familial home. However, the year effect is less negative for real siblings. We suggest that this is due to decreasing family influence. In other words, there well may be a long arm of 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 synthetic 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 neighbourhood effect.

A previous study (van Ham et al., 2014) found that childhood environment is often reproduced into adulthood. In this study, we analyse the effect of the parental neighbourhood on the difference in neighbourhood status within sibling pairs, rather than the actual neighbourhood outcome. We find a statistically significant effect of the parental neighbourhood, suggesting that the difference in neighbourhood status between siblings is positively related to the share low-income people in the parental neighbourhood. In other words, siblings brought up in less advantaged areas live more diverse lives as adults in terms of their neighbourhood paths. This result holds for both real and synthetic pairs, giving evidence that this is a result of neighbourhood environment – contextual disadvantage - rather than inherited disadvantage (family).

When analysing the effects of ethnic background, we find that children to parents born outside Sweden, and especially in a Non-Western country, are substantially more different than children to Swedish parents. Again, this signals that some children from "less resourceful" backgrounds do well on the housing market while others remain in areas similar to their childhood neighbourhood environment. The difference is substantially smaller for real siblings compared to the synthetic pairs. Part of the explanation might be related to data construction where synthetic pairs were allowed to have parents from different countries within a country region. However, we cannot exclude a family effect in this outcome. Whereas both neighbourhood and ethnic background are highly significant, family income level is not. We find an effect of being a mid-income earner, which reduces difference compared to being a low income earner, but the effect is only barely statistically significant. We find no evidence of differences between real and synthetic pairs with regard to income background.

The mid column of table 2 presents results for the real siblings. The results from this table best explain what affects the differences in neighbourhood status of siblings. (The right-hand side model, of only synthetic pairs, is mainly shown for sake of comparison). The patterns for the parental variables described above are intact, albeit with some changes in levels for especially the ethnicity variables. We also find that for real pairs, children to fathers from Non-western countries live more different lives than those whose fathers come from Eastern European countries. Age is highly significant for the real siblings, where siblings further apart in age are more likely than especially twins to live in more different neighbourhoods. This age effect is however completely missing for synthetic pairs (the right-hand column). In both cases, we find that females are less different than both same-sex male and mixed pairs.

The remaining individual variables are time-invariant, this is why the models estimate both within- and between effects. The main results from the within-part of the model are that the neighbourhood trajectories of siblings are more different with increasing income differences, when children are born, when they are studying, when one or both leave the parental municipality, and when one leaves the rental segment for ownership. Their trajectories become less similar when both have partners and when they live in any other tenure combination than two rentals or one renter-one owner. These patterns are valid for the synthetic pairs as well but there are some differences in the size of the coefficients. For example, the income coefficient is .3 for synthetic pairs compared to .1 for real siblings, and the coefficient for living in the same municipality but not the parental one are .5 and 1.3 respectively. We suggest that both these results indicate a family effect – siblings are less prone to move to more different areas as their incomes increases (or decreases) which may be due to socialisation of affection (if living close in space) whereas the effect for municipality may be due to siblings actively choosing to live in the same municipality and hence the same (or a nearby) neighbourhood.

Whereas the explanatory power of our models is rather limited for within-variation (about 6 per cent), the model is substantially better in explaining differences between sibling pairs (about 18 per cent of the variation for real siblings). The results suggest that sibling pairs where at least one has a partner, income differences are larger, and where one or preferably both are students live more different lives than other sibling pairs. This is also, not surprisingly, 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 neighbourhood quality. Again, we find very similar results for real siblings and our synthetic sample which could be expected when analysing differences between pairs.

Table 2 about here

Our model thus confirms the tentative conclusion from the descriptive tables and figures, namely that real siblings indeed are more similar than synthetic pairs. It also confirms that parental background affects the degree of similarity where siblings from more deprived neighbourhoods tend to live in more different neighbourhoods environments after having left the parental home. As previously discussed, a hypothetic explanation for this latter difference is that some individuals from the most deprived areas move "up" whereas moving "down" is less common (with possible exception of the first years of the independent housing career, although here the outcome could be the result of some individuals continuing studying and living in student accommodation for the first period). Figures 4a and b provide a simple test of this hypothesis by plotting the share low income people in the "best" neighbourhood (i.e. the one with the lowest share) each sibling lives in during these 14 years. We separate graphs by parental neighbourhood decile. For presentation purposes, we only show results for decile 1 ("richest" neighbourhoods) and decile 10. The diagonal represents no difference between siblings. From the graphs, we can clearly see two things. Firstly, individuals growing up in the decile 1 live on average in better neighbourhoods themselves. The dots in figure 4a are clustered around 20% low income people which is well below the mean (about 30%). Secondly, the clustering of dots is close to the diagonal. In contrast, figure 4b, showing the distribution of sibling pairs originating from decile 10, depicts a more scattered picture. In this graph as well, there is a tendency of clustering around the diagonal at about 15-35 % percent low income people but there are also several examples of pairs where one do fairly well whereas the other

lives in neighbourhoods with 50-60% low income people (which corresponds to 2 standard deviations above the mean). In addition, we also see more values higher up at the diagonal which, although meaning little difference between siblings, provide support to findings from previous papers about intergenerational transmissions of neighbourhood status.

Figure 4 a and b. Graphs showing the relationship between siblings in terms of the share low income neighbours in the "best" neighbourhood they reach during their independent housing career. The diagonal line represents zero difference between siblings.

a) parental decile 1   b) parental decile 10
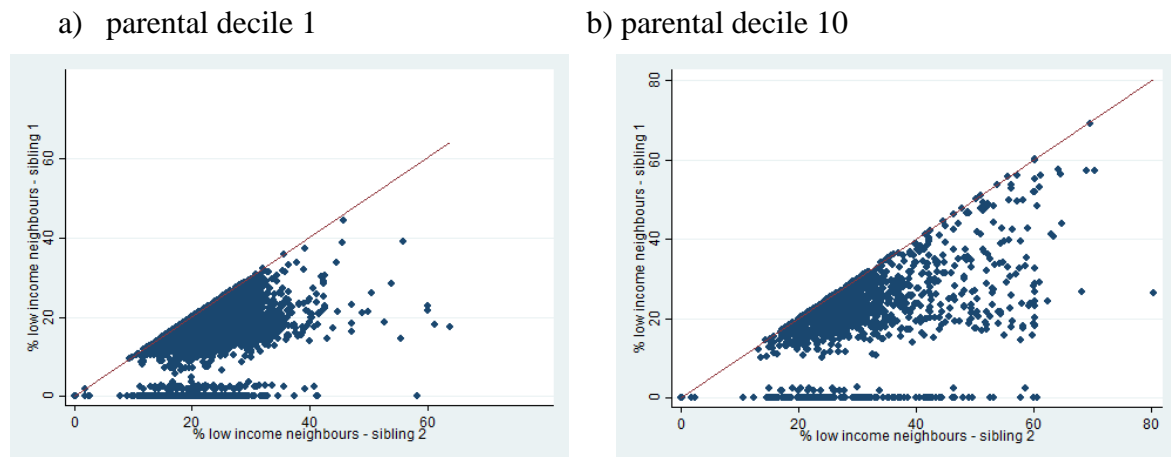
Discussion

The issue of multigenerational disadvantage and the reproduction of disadvantage over time has been highlighted as a serious economic, social and cultural problem. Attention has increasingly been turned toward understanding how transmission mechanisms may work. To shed new light on this topic we have proposed a framework in which we view two modes of experiencing disadvantage through childhood – inherited and experienced – and analysed these modes with regard to the neighbourhood trajectories that individuals move through once they leave the parental home. In order to analyse the effects of these two modes we constructed two datasets from Swedish population registers. The first dataset included real siblings so that we could explore the impact of home and neighbourhood on later life residential careers. The second dataset used synthetic siblings, individuals similar to the real siblings with the important difference of living in a different household. This enabled us to disentangle some of the effects of the childhood neighbourhood and household.

In exploring the effects of inherited and childhood contextual disadvantage on adult neighbourhood trajectories of siblings (real and synthetic), we developed three hypotheses. The first hypothesis was that a*fter controlling for family environment the childhood neighbourhood will continue to be a site of significant influence on later life neighbourhood careers.* There is clear evidence to confirm that this is the case. In the modelling we included an array of critical control variables both for the family and for the individual child. Even when we have identified a significant family effect, there was still an effect of the childhood neighbourhood that extended beyond 8 years after leaving the parental neighbourhood. This is evidence of what we termed in the introduction the long arm of the childhood residential neighbourhood. The

second hypothesis suggested that *after controlling for family influences, the neighbourhood contribution to understanding late in life neighbourhood outcomes will be significantly reduced in comparison to models that only consider neighbourhood.* Again, we identified evidence that this was the case. Family influences are important and significantly contribute to late life residential outcomes. The third hypothesis stated that *the contribution that neighbourhood and family environments make to later in life neighbourhood outcomes will remain throughout later life but will attenuate over time* spoke to the notion that the impacts of the family would decrease 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 their residential trajectories. More specifically, there is a 'half-life'[10] attached to family influences where the preferences of you a partner and your own life achievements 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 highlighting the differences between the real and synthetic pairs. The synthetic pairs are just that – one instance of a potential pairing of two similar and geographically co-located individuals who are not related. We recognise that we could construct multiple versions of the synthetic pairs to further explore the robust of the findings. However, we are interested in this paper in drawing exploratory conclusions to help better understanding around the potential for influence of the household and neighbourhood and as a result consider the comparison to be sufficient for the conclusions we draw.

In conclusion, we find that both inherited and contextual disadvantage are important for the reproduction of neighbourhood 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 neighbourhoods 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. Whilst the impact of inherited and contextual disadvantage attenuates over time, the legacy is such that the stickiness' (Glass & Bilal, 2016) lasts for a long time, reducing opportunities for social and spatial mobility.

Acknowledgements

References

Andersson, R. & Hedman, L (2016) Economic decline and residential segregation: a Swedish study with focus on Malmö. Urban Geography 37(5) 748-768

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[10] We use the notion of a half life here to make the analogy the term commonly associated with radioactive decay where it refers to the time taken for a quantity to reduce to half its original strength. In referencing this term, we are highlighting there is a period where the influence of your childhood home environment ha declined and your current independent trajectory is now more influential.

Bailey, N., & Livingston, M. (2008). Selective migration and neighbourhood deprivation: evidence from 2001 census migration data for England and Scotland. *Urban Studies*, *45*(4), 943-961.

Bauer, P., & Riphahn, R. T. (2006). Timing of school tracking as a determinant of intergenerational transmission of education. *Economics Letters*, *91*(1), 90-97.

Black, S. E., Devereux, P. J., & Salvanes, K. G. (2003). *Why the apple doesn't fall far: Understanding intergenerational transmission of human capital* (No. w10066). National Bureau of Economic Research.

Black, S. E., & Devereux, P. J. (2010). *Recent developments in intergenerational mobility* (No. w15889). National Bureau of Economic Research.

Black, S.E. & Devereux, P.J. (2011) Recent developments in intergenerational mobility, pp. 1487-1541in O. Ashenfelter & D. Card (Eds.) *Handbook of labor economics,* Volume 4

Cameron, D. (2014) Speech to the Relationships Alliance Summit, held at the Royal College of GPs, on putting families at the centre of domestic policy-making. https://www.gov.uk/government/speeches/david-cameron-on-families Accessed 17/08/2016

Coulter R., van Ham M. & Findlay A. (2016) Re-thinking residential mobility: Linking lives through time and space. Progress in Human Geography 40, 352-374.

Davis, O. S., Haworth, C. M. A., Lewis, C. M., & Plomin, R. (2012). Visual analysis of geocoded twin data puts nature and nurture on the map. *Molecular psychiatry*, *17*(9), 867-874.

De Vuijst E., van Ham M. & Kleinhans R. (2017) The moderating effect of higher education on the intergenerational transmission of residing in poverty neighbourhoods. Environment and Planning A 49(9), 2135–2154.

d'Addio, A.C.(2007) *Intergenerational Transmission of Disadvantage: Mobility or Immobility Across Generations* OECD Social, Employment and Migration Working Papers No. 52 OECD Publishing

Dohmen, T., Falk, A., Huffman, D., & Sunde, U. (2011). The intergenerational transmission of risk and trust attitudes. *The Review of Economic Studies*, *79*(2), 645-677.

Feijten, P., & Van Ham, M. (2009). Neighbourhood change... reason to leave?. *Urban studies*, *46*(10), 2103-2122.

Feijten, P., Hooimeijer, P., & Mulder, C. H. (2008). Residential experience and residential environment choice over the life-course. *Urban studies*, *45*(1), 141-162.

Galster, G., & Sharkey, P. (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., & Bilal, U. (2016). Are neighborhoods causal? Complications arising from the 'stickiness' of ZNA. *Social Science & Medicine*, *166*, 244-253.

Gustafson, B., K. Katz & Österberg T. (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 & Place*, DOI: 10.1002/psp.2028

Hauser, R. M. (1998*). Intergenerational economic mobility in the united states measures, differentials and trends*. Center for Demography and Ecology, University of Madison-Wisconsin.Hedman, L., Van Ham, M., & Manley, D. (2011). Neighbourhood choice and neighbourhood reproduction. *Environment and Planning A*, *43*(6), 1381-1399.

Hedman L., Manley D., van Ham M. & Östh J. (2015) Cumulative exposure to disadvantage and the intergenerational transmission of neighbourhood effects. Journal of Economic Geography 15(1), 195-215.

Hedman L., van Ham M. & Tammaru T. (2017) Three generations of intergenerational transmission of neighbourhood context. IZA Discussion Paper No. 11218 (www.iza.org).

Helderman, A., & Mulder, C. (2007). Intergenerational transmission of homeownership: The roles of gifts and continuities in housing market characteristics. *Urban Studies*, *44*(2), 231-247.

Katz L.F., Kling J.R. & J.B. Liebman (2000) Moving to Opportunity in Boston: Early Results of a Randomized Mobility Experiment. NBER Working Paper No. w7973.

Kendig, H. L. (1984). Housing careers, life cycle and residential mobility: implications for the housing market. *Urban Studies*, *21*(3), 271-283.

Kleinepier M. & van Ham M. (2017a) The Temporal Stability of Children's Neighborhood Experiences: A Follow-up From Birth to Age 15. Demographic Research 36(59), 1813-1826.

Kleinepier T. & van Ham M. (2017b) Ethnic differences in duration and timing of exposure to neighbourhood disadvantage during childhood. IZA Discussion Paper No. 10944 (www.iza.org).

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): 207–226.

Mayer, S. E., & Lopoo, L. M. (2005). Has the intergenerational transmission of economic status changed?. *Journal of Human Resources*, *40*(1), 169-185.

McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual review of sociology*, *27*(1), 415-444.

Merlo, J., Ohlsson, H., Chaix, B., Lichtenstein, P., Kawachi, I., & Subramanian, S. V. (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.

Morris, T., Manley, D., & Sabel, C. E. (2017). Residential mobility: Towards progress in mobility health research. *Progress in Human Geography*, 42(1) 112–133

Mundlak, Y. (1978). On the pooling of time series and cross section data. *Econometrica: journal of the Econometric Society*, 69-85.

De Nardi, M. (2004). Wealth inequality and intergenerational links. *The Review of Economic Studies*, *71*(3), 743-768.

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

OECD Inequality Update 2016 "Income inequality remains high in the face of weak recovery"

Oreopoulos, P. (2003). The long-run consequences of living in a poor neighborhood. *The quarterly journal of economics*, *118*(4), 1533-1575.

Raab, M., Fasang, A. E., Karhula, A., & Erola, J. (2014). Sibling similarity in family formation. *Demography*, *51*(6), 2127-2154.

Sharkey, P. (2008) Intergenerational transmission of context, *American Journal of Sociology* 113(4), 931-969

Sharkey, P. (2013) *Stuck in Place. Urban Neighborhoods and the End of Progress toward Racial Equality*, Chicago and London: University of Chicago Press

Solon, G. (1999) Intergenerational Mobility in the Labor Market, pp.1761-1800 in: O. Ashenfelter & D. Card (Eds.) *Handbook of Labor Economics*, Volume 3

Solon, G. (2004). A model of intergenerational mobility variation over time and place. *Generational income mobility in North America and Europe*, 38-47.

Solon, G., Page, M.E., Duncan, G.J. (2000) Correlation between neighboring children in their subsequent educational attainment. *The Review of Economics and Statistics* 82, 383–392

Tammaru, T., Marcinczak, S., van Ham, M., & Musterd, S. (eds) (2016). East Meets West: New Perspectives on Socio-economic Segregation in European Capital Cities.

van Ham, Maarten, and Tiit Tammaru. (2016) New perspectives on ethnic segregation over time and space. A domains approach." *Urban Geography* 37.7: 953-962.

Van Ham, M., Manley, D., Bailey, N., Simpson, L., & Maclennan, D. (2012). Neighbourhood effects research: new perspectives. In *Neighbourhood effects research: New perspectives* (pp. 1-21). Springer Netherlands.

van Ham, M., Manley, D., Bailey, N., Simpson, L., & Maclennan, D. (2013) (Eds.). *Understanding Neighbourhood Dynamics. New Insights for Neighbourhood Effects*. Springer Netherlands.

Ham, M., Hedman, L., Manley, D., Coulter, R., & Östh, J. (2014). Intergenerational transmission of neighbourhood poverty: an analysis of neighbourhood histories of individuals. *Transactions of the Institute of British Geographers*, *39*(3), 402-417.

Vartanian, T. P., & Buck, P. W. (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.

Vartanian, T. P., Walker Buck, P., & Gleason, P. (2007). Intergenerational neighborhood-type mobility: examining differences between blacks and whites. *Housing Studies*, *22*(5), 833-856.

Vollebergh, Wilma AM, Jurjen Iedema, and Quinten AW Raaijmakers. "Intergenerational transmission and the formation of cultural orientations in adolescence and young adulthood." *Journal of Marriage and Family* 63.4 (2001): 1185-1198.

Results of hybrid model. Dependent variable = difference in share low income neighbours between siblings (real and synthetic pairs)

		ALL			REAL PAIRS ONLY			SYNTHETIC PAIRS ONLY		
		Coeff.	Std. Err.	Sign	Coeff.	Std. Err.	Sign	Coeff.	Std. Err.	Sign
TIME INVARIANT VARIABLES										
Random (0) or real sibling pair	Random	Ref	Ref	Ref						
	Real	-1.762	.476	***						
Years since leaving the parental home	0-7 years	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	8-14 years	-1.093	.070	***	-.684	.026	***	-1.101	.093	***
	*8-14 years * real sibling*	.405	.070	***						
% Low income people in parental nbd		.040	.012	**	.052	.003	***	.036	.012	**
	% low income real sibling*	.011	.012							
Country of birth of father	Sweden	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	West	.012	.411		.523	.101	***	-.005	.433	
	East	2.900	.999	**	1.293	.213	***	2.935	1.048	**
	Non-west	2.226	.744	**	2.069	.190	***	1.991	.790	*
	*West * real sibling*	.508	.424							
	*East * real sibling*	-1.610	1.021							
	*Non-west * real sibling*	-.174	.766							
Income level of father	Low	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Middle	-.613	.309	*	-.065	.088		-.607	.325	
	High	.278	.287		.202	.077	*	-.245	.302	
	*Middle * real sibling*	.552	.321							
	*High * real sibling*	.490	.298							
Age difference	0 years	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	1 year	.647	.121	***	.769	.145	***	.377	.223	
	2 years	.767	.115	***	.896	.136	***	.363	.247	
	3 years	.796	.116	***	.920	.136	***	.456	.271	
Sex difference	Both male	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Both female	-1.001	.070	***	-.979	.073	***	-1.175	.248	***
	One male, one female	-.416	.062	***	-.389	.064	***	-.704	.213	**
TIME VARIANT VARIABLES (DEVIATIONS FROM MEAN)										
Difference in couple formation	Both singles	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Both with partners	-.470	.057	***	-.493	.059	***	-.198	.214	
	One single, one with partner	-.024	.037		.007	.038		-.236	.142	
Children in household	Both no	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Both yes	.425	.060	***	.391	.062	***	.832	.223	***
	One yes, one no	.258	.040	***	.255	.041	***	.316	.150	*
Income difference (100 SEK ~ 10 euro)		.104	.005	***	.101	.006	***	.294	.042	***
Difference in student status	None is a student	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Both are students	3.76	.047	***	3.761	.048	***	3.646	.197	***
	One student, one not	1.608	.027	***	1.574	.028	***	1.849	.098	***
Difference in tenure	Both in rental	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Both in cooperative	-3.214	.059	***	-3.229	.061	***	-2.990	.219	***
	Both in ownership	-2.526	.044	***	-2.502	.045	***	-2.807	.154	***
	One in rental, one in coop	-.468	.037	***	-.411	.039	***	-1.100	.125	***
	One in coop, one in ownership	-1.362	.045	***	-1.326	.047	***	-1.776	.154	***
	One in rental, one in ownership	1.208	.033	***	1.270	.035	***	.536	.115	***
Difference in municipality	Same mun, parental one	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Same mun, not parental one	.652	.062	***	.592	.064	***	2.111	.274	***
	Different municipalities	3.667	.036	***	3.699	.038	***	3.239	.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	.217	***	1.057	.225	***	1.527	.791	
	One single, one with partner	1.061	.169	***	1.059	.176	***	1.114	.594	
Children in household	None have children	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Both have children	-.913	.204	***	-.862	.212	***	-1.481	.763	
	One has children, one not	-.215	.153		-.188	.159		-.534	.547	
Income difference (100 SEK ~ 10 euro)		.391	.018	***	.314	.020	***	.688	.165	***
Difference in student status	None is a student	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Both are students	8.772	.254	***	8.819	.262	***	8.075	.983	***
	One is student, one not	2.146	.140	***	2.000	.147	***	3.050	.491	***
Difference in tenure	Both in rental	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Both in cooperative	-2.876	.221	***	-2.796	.229	***	-4.129	.843	***
	Both in ownership	-4.800	.150	***	-4.741	.156	***	-5.585	.533	***
	One in rental, one in coop	-.200	.162		.328	.171		-1.147	.529	*
	One in coop, one in ownership	-1.509	.181	***	-1.367	.190	***	-2.962	.576	***
	One in rental, one in ownership	.196	.162		.224	.150		-.423	.465	
Difference in municipality	Same mun, parental one	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
	Same mun, not parental one	-.517	.138	***	-.447	.142	**	-1.450	.602	*
	Different municipalities	3.258	.071	***	3.269	.074	***	3.073	.238	***
Constant		6.393	.479	***	4.458	.193	***	7.320	.640	***
N		700687			642081			58606		
Number of groups		52566			47574			4992		
Average observations per group		13.3			13.5			11.7		
R2 (within)		0.0604			0.0612			0.0549		
R2 (between)		0.1785			0.1813			0.1526		
R2 (overall)		0.1028			0.1041			0.0922		