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Residential pathways: Understanding moving dynamics in gentrifying neighborhoods through a multi-dimensional sequence analysis

Kyri Maaïke Joey Janssen , Clémentine Cottineau-Mugadza , and Reinout Kleinhans 

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ABSTRACT

Gentrification and its effects on residential mobility have been widely studied, yet little attention has been given to the diverse socio-spatial trajectories of individuals moving into or out of gentrifying neighborhoods. This study addresses this gap by using detailed register data to examine longitudinal residential mobility patterns within a gentrifying city. We employ a multi-channel sequence analysis to track the movement trajectories of individuals within the Rotterdam region, focusing specifically on those who relocated to or from neighborhoods identified as gentrifying by policy-makers. Consequently, we examine how these trajectories intersect with other life-course characteristics of individuals to construct a typology of the diverse residential profiles emerging within the gentrification process. Our findings showcase that residential mobility in gentrifying neighborhoods does not follow a straightforward vacancy chain of low-income households moving out and gentrifiers moving in. Instead, gentrifiers increasingly move within these neighborhoods, gradually limiting the housing opportunities of low-income individuals.

KEYWORDS

Gentrification; displacement; residential mobility; sequence analysis

Introduction

The transformation of inner-city, working-class neighborhoods into middle- and upper-middle-class residential areas is widely described as gentrification. As gentrification involves the influx of relatively affluent newcomers and the displacement of low-income households, it is closely tied to the study of residential mobility and population dynamics (Rérat et al., 2010). While extensive research efforts have been dedicated to understanding the evolving residential dynamics within gentrifying neighborhoods, the gentrification literature often limits itself to two distinct types of movers, namely, the “gentrifiers” and “displaces” (Janssen et al., 2023). Although this characterization aligns with the conceptual framework of gentrification, it provides little insight into the different types of movers and how the moves to and from gentrifying neighborhoods fit within the life-course trajectory of an individual. Indeed, we have an extensive understanding of wealth accumulation through housing and residential moves over the life course at the individual level (Modigliani, 1988) and an understanding of gentrification as a process of wealth accumulation through the lens of rent gap theory at the neighborhood level (N. Smith, 1979). Unfortunately, these two streams of literature rarely intersect, and we lack scholarship on how individual life-course trajectories, relocation, and social mobility contribute to and coalesce into the collective phenomenon of gentrification. Recognizing the heterogeneity of residential mobility patterns that exist in a gentrifying neighborhood and understanding

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how they fit within individual life-course trajectories is crucial for a more nuanced understanding of gentrification dynamics.

In 2002, D. Smith argued that gentrification-related relocations should be understood in light of a migration framework, acknowledging how residential moves relate to various transitions in one's life course. We aim to contribute to the field of gentrification studies by applying a longitudinal approach, focusing on the residential trajectories of individuals moving to and from gentrifying neighborhoods. Thus, instead of relying on static snapshots in time, we take a broader approach by examining individual residential pathways over time. This approach allows us to explore how these trajectories align with shifts in individual social and demographic characteristics, as well as personal transitions, i.e., how the spatio-temporal aspects of their life course interact with the situated context of gentrification. By doing so, we move beyond descriptive accounts of who moves in and out, offering insights into the underlying processes that shape neighborhood change and revealing how gentrification unfolds as a dynamic, life-course-driven phenomenon rather than a series of isolated events. Our goal is to unravel the diverse but also co-existing types of residential movers entering and leaving gentrifying neighborhoods. Subsequently, we examine how residential pathways, operationalized as decennial sequences of neighborhood residence, fit within a gentrification framework and look for evidence of diversity among typical gentrifier and displace trajectories.

We address the following research question: How do the life-course trajectories of individuals moving into and out of gentrifying neighborhoods align with academic conceptualizations of gentrifiers and displaced residents?

In this study, we use multi-channel sequence analysis to track individuals from the Rotterdam metropolitan region who moved to or from neighborhoods designated as gentrifying in Rotterdam housing policy documents (Rotterdam Municipality, 2003, 2007, 2016). By relying on the detailed longitudinal register data provided by Statistics Netherlands (CBS), we can characterize the yearly residential location of each individual for a period of ten years. We examine how these trajectories intersect with individual economic, social, and demographic features and their evolution to construct an overview of the diverse residential profiles emerging within the gentrification process. By providing a thorough theoretical framework on typologies of movers related to the gentrification process, we assess whether residential trajectories from the gentrifying neighborhoods in Rotterdam match the mover typologies proposed in the gentrification literature.

Gentrification

Scholars have examined gentrification from diverse angles: some focus on the role of capital flows and housing investments (Lees et al., 2016; N. Smith, 1979), while others explore shifts in population dynamics and consumption patterns (Karsten, 2003). Recently, housing restructuring and new financial systems in many Western contexts have led to a significant rise in housing prices and investment. Investors and developers speculate on gentrification, with profit emerging as a major driving force behind the phenomenon (Hamnett, 2021). At the same time, scholars are recognizing government intervention as a key driver of neighborhood upgrading and gentrification (Lees et al., 2016).

Early accounts of gentrification, most notably Clay's (1979) staged model, described neighborhood change as a linear sequence moving from marginal pioneers to full-scale reinvestment and eventual transformation. While this framework remains influential for highlighting the visible progression of gentrification, it has been criticized for presenting the process as too predictable and neighborhood-bound. More recent work offers a more dynamic interpretation that situates gentrification within the broader context of fundamental class transformations at the citywide level (Hamnett, 2021). From this perspective, gentrification is not an isolated event but a spatial manifestation of the transition from an industrial to a post-industrial economy. The decline of manufacturing and the traditional manual working class, alongside the expansion of a highly educated professional and managerial middle class, has reshaped the urban labor market and

generated the supply of “potential gentrifiers.” Hamnett’s framework also provides a more nuanced account of neighborhood change by moving beyond a simple focus on direct displacement. While forced displacement is a significant and damaging outcome, Hamnett stresses the importance of distinguishing it from long-term replacement. Over the course of decades, the workforce of a city naturally turns over through retirement and labor market entry. If the new entrants have a markedly different class profile from those leaving, neighborhoods can be transformed “imperceptibly” through gradual replacement. Complementing this is what Marcuse defines “exclusionary displacement,” in which rising housing costs and shifting amenities effectively prevent lower-income groups or their successors from accessing areas they once inhabited (Slater, 2009). In this sense, gentrification is less about linear stages of development and more about the deep, citywide restructuring of class relations that gradually reshapes the urban housing market.

In contemporary Dutch cities, strong tenant protection laws make direct displacement less visible, while exclusionary forms of gentrification have become the most prevalent manifestation of displacement. Moreover, the substantial share of social housing in the Netherlands (roughly 28%, Centraal Bureau voor de Statistiek [CBS], 2025) allows policymakers and housing associations to actively shape the pace and direction of gentrification, either stimulating or constraining it through targeted interventions. In this context, gentrification emerges not only as a consequence of class transformation and traditional economic dynamics such as rent gaps, but also as a process deeply influenced by local and regional policies that restructure the housing stock to attract financially stable, middle-class households to formerly disadvantaged neighborhoods (Uitermark et al., 2007).

Residential mobility

Research on residential mobility generally concludes that households tend to relocate when their current housing no longer satisfies their needs, signaling a state of housing disequilibrium (Clark & Ledwith, 2006). Earlier models of life-course theory, most notably Mulder and Hooimeijer (1999), conceptualized mobility as a largely linear process: life events (e.g., partnership formation, childbirth, or job change) trigger mismatches between household needs and housing, which in turn motivate a move to restore balance. Their framework usefully distinguished between resources and restrictions at the individual level and opportunities and constraints at the structural level, but it has been criticized for treating these influences as relatively one-directional and event-driven.

More recent work reframes this relationship in a more dynamic and relational way. Coulter et al. (2016) argue that mobility and immobility should be understood as “relational practices” that unfold over the life-course. Rather than viewing moves as discrete responses to life events, they propose a recursive process in which mobility itself reshapes family relationships, neighborhood trajectories, and social inequalities over time. A complementary review of life-course trajectories in housing studies (Coulter et al., 2020) similarly stress that moves are part of ongoing biographies rather than isolated events. A person’s decision to move is not made in a vacuum; it is deeply connected to other people and to society. A central dimension of this relational approach is the role of social support. In increasingly expensive housing markets, young adults frequently depend on intergenerational financial support to access homeownership, a process that reproduces social inequalities by dividing those who can rely on family wealth from those who cannot. In addition, the traditional definition of a move as a one-off transition from one dwelling to another is no longer adequate to capture contemporary mobility patterns. Increasingly, scholars point to practices such as residential itinerancy, where individuals regularly divide their time between multiple homes (e.g., children in joint custody or adults in “living apart together” relationships), and residential transience, marked by repeated short-term moves often seen among young adults navigating higher education, unstable job markets, or returning intermittently to the parental home as a safety net.

In general, it has been argued that researchers have overemphasized the residential preferences and aspirations of households at the expense of their financial restrictions (Galster, 2019). This issue is of

particular concern as the increased popularity of cities in the post-industrial era has occurred alongside a housing affordability crisis. Initially affecting low-income and migrant households, this crisis has since extended to middle-income families (Booi, 2024) and young individuals without prior homeownership (Hochstenbach & Boterman, 2015). Simultaneously, the growth of affordable and social housing on the city outskirts has contributed to a concentration of poverty in those areas (Hochstenbach & Musterd, 2018). The next sections outline the diverse types of gentrifiers and displaced residents commonly discussed in academic literature, supporting our empirical search for such residential profiles during the gentrification process.

The gentrifiers

Gentrifiers are commonly identified by their reproduction of cultural capital and their preference for an urban habitus. A substantial body of literature conceptualizes the gentrifier, discussing either their profession (Ley, 1997), attitudes (Brown-Saracino, 2019), or socio-demographic characteristics (Blasius et al., 2016). In the residential domain, understanding the conditions for households to move into or out of a gentrifying neighborhood also requires considering the current phase and corresponding life-course transitions of an individual or household (Hochstenbach & Boterman, 2018). Therefore, following Schlichtman et al. (2018) and Hochstenbach and Boterman (2018), we conceptualize a fourfold life-course typology of the gentrifier: the early gentrifier, the late gentrifier, the family gentrifier, and the empty-nest gentrifier.

Early gentrifiers—often referred to as marginal or pioneer gentrifiers—are typically characterized by limited financial resources but a strong preference for the social and cultural amenities of inner-city neighborhoods (Schlichtman et al., 2018). Students, artists, and recent college graduates are often considered early gentrifiers (Blasius et al., 2016). The affordability of housing is a crucial factor in their residential choice. Consequently, these early gentrifiers seek affordable rental housing in neighborhoods that are still in the early stages of gentrification (Hochstenbach & Boterman, 2018). Besides affordability, Schlichtman et al. (2018) describe early gentrifiers as having a strong preference for central neighborhoods to maximize accessibility, coupled with a desire to live in aesthetically pleasing neighborhoods and buildings.

The *late gentrifiers*, often referred to as yuppies (young urban professionals) or DINKs (dual-income, no kids), have greater financial means and are thus typically attracted to neighborhoods in the later stages of gentrification. Compared to early gentrifiers, late gentrifiers are in a later life phase (Ocejo, 2011), often characterized by dual incomes and stable employment. Households then typically have improved financial means and apply a more risk-averse strategy to housing compared to early gentrifiers (Hochstenbach & Boterman, 2018). Late gentrifiers seek to own property that is relatively inexpensive compared to other options and is spacious enough to accommodate potential household expansion, with the added expectation that its value will appreciate over time. While centrality remains important, late gentrifiers have the means to reside in higher-quality neighborhoods with aesthetic appeal (Schlichtman et al., 2018).

Family gentrifiers, usually older and more established in their careers than late gentrifiers, have children. Although their income is similar to that of late gentrifiers, they face higher financial constraints due to the size of their household. Childbirth often disrupts gentrifiers' urban habitus, shifting their priorities toward larger, family-oriented housing and leading them to move to more traditional suburban environments (Bridge, 2006). By contrast, family gentrifiers, trade housing perks and square-meterage to remain in the city (Karsten, 2003). The literature outlines several reasons for this, which include the proximity to employment and family amenities such as schooling, daycare, and parks (Butler & Robson, 2001), as well as the appeal of the left-wing climate in cities (Bridge, 2006). Karsten (2003) shows that dual-earner households with children are attracted to central locations because of proximity to both workplaces and amenities such as childcare and schools. Van Den Berg (2013) further notes that family gentrifiers have been a target of Rotterdam's housing policies, with new developments designed to attract high-income nuclear families.

Finally, *empty-nest gentrifiers* are individuals in a life stage where their children have left home, resulting in increased financial resources. Eventually, this life phase coincides with retirement, resulting in a more flexible time-space trajectory (Hochstenbach & Boterman, 2018). This type of gentrifier has been studied less in academic literature; therefore, there is little consensus on their motives and characteristics. Nevertheless, articles describing empty-nest gentrifiers generally portray them as affluent households with substantial economic capital: these households are able to move into mature gentrifying neighborhoods. In one study, Bounds and Morris (2005) write that luxurious apartment complexes developed in the inner-city neighborhoods of Sydney cater specifically for the residential needs of elderly couples, providing empty-nest gentrifiers with an age-proof and rather homogeneous environment within the city center. Table 1 summarizes the academic knowledge on the different gentrifier profiles and their characteristics.

The displaced

On the flip side of the gentrification process are those negatively affected by it—the displaced. Displacement can occur directly through, for instance, stark increases in rent prices or housing demolition, forcing households to move out of the neighborhood. The scholarly literature finds little evidence of elevated numbers of low-income households moving out of gentrifying tracts relative to non-gentrifying tracts (e.g., Freeman et al., 2016, 2024). However, displacement can also occur indirectly through exclusionary mechanisms such as a reduction in affordable housing stock, which limits low-income households from moving in (Marcuse, 1985). Rising housing prices restrict the choices of economically vulnerable residents, enhancing socio-spatial inequalities (Millard-Ball, 2002). In this paper, we conceptualize displacement as both forced relocation due to housing demolition and indirect effects, such as restricted residential opportunities for low-income households facing residential triggers.¹

While gentrifiers’ residential choices are typically seen as shaped by diverse preferences aligned with their socio-economic and demographic profiles, displaced residents are often characterized mainly by limited financial resources and the involuntary nature of their move (Banabak et al., 2024). Because displacement restricts choice, those affected may share fewer common characteristics, as they are grouped by circumstance rather than preference. Although prior research has examined which households are most at risk of eviction (Desmond & Gershenson, 2017), less is known about the life-course factors shaping the out-migration of low-income households from gentrifying areas or how these factors influence where they relocate. Therefore, we conceptualize displaced individuals through their spatial mobility patterns and subsequently describe how these patterns relate to their life-course trajectory. We distinguish the following three displacement typologies: excluded displaced, remaining displaced, and suburbanized displaced.

The *excluded displaced* are working-class households that have moved from a gentrifying neighborhood to a low-income, non-gentrifying area near the city center. Rosenblatt and DeLuca (2012)

Table 1. The gentrifier framework.

	The early gentrifier	The late gentrifier	The family gentrifier	The empty-nest gentrifier
Proximity	City center	Public amenities (parks)	Employment and family facilities	Ø
Housing trajectory	Student/Private rental	Private rental/Buying house	Buying house/Homeowner	Steady homeowner
Professional trajectory	Student/start working	Start working/Stable employed	Stable employed	Entering retirement
Financial resources	Low income	Middle income	Middle income	High income
Cohabitation	Single	Couples	Couples	Couples
Children	No children	No children	Expecting/having children	Children leaving/no children

Ø—No information identified in the literature.

explain that low-income households often relocate to poverty-concentrated areas due to changing housing needs and affordability issues in their former, more expensive neighborhoods. These low-income households may prefer an inner-city environment, but with limited space in gentrifying or middle-income to affluent areas, they are compelled to seek the next affordable alternative, effectively excluding them from their desired neighborhoods. Hochstenbach and Musterd (2018) note that low-income residents who remain in central areas are often employed, underscoring their reliance on the city for work. In addition, displaced households may choose to stay near the city center to maintain proximity to social networks and daily routines—a consideration that is particularly important for families with children (Clampet-Lundquist, 2004).

The second displacement pattern identified in the literature is the *remaining displaced*: households who stay in their gentrifying neighborhoods despite rising rents, insecure or informal housing, and overcrowding (Zhang & He, 2018). While much research highlights how gentrification intensifies displacement pressures on incumbent residents (cf. Twigge-Molecey, 2014), other studies note a more complex picture. Brummet and Reed (2019), for example, argue that gentrification can also produce opportunities for original residents and their children. Research further shows that vulnerable groups, such as minorities and single parents, often find ways to remain, for instance by doubling up with family or friends to stay within their social networks (Newman & Wyly, 2006). Similarly, Guibard and Le Goix (2024) find that in the Paris region, single parents and households receiving disability allowances are less likely to move out. Similar to the excluded group, displaced households moving within the same neighborhood are more likely to have children and want to preserve their daily routines and social networks. Winke (2021) shows that steep rent increases and resulting cost burdens actually reduce low-income households' likelihood of moving out, as limited affordable alternatives and a desire to stay in the city lower their overall mobility. To adjust for the Dutch context, where rent regulations protect tenants but economic liberalization reduces affordable housing in gentrifying areas, we define the “*remaining displaced*” trajectory as movers relocating within a gentrifying environment.

Finally, an increasing body of literature on the suburbanization of poverty indicates that low-income households, often driven out by gentrification, are relocating to the urban periphery (Hochstenbach & Musterd, 2018). For instance, a comparative empirical study by Winke (2021) reveals that low-income households moved longer distances if they relocated from neighborhoods experiencing sharp price increases compared to more price-stable neighborhoods. On the other hand, Freeman et al. (2024) identifying no significant relationship between neighborhood disadvantage or relocation distance for low-income households leaving gentrifying neighborhoods. In light of this, it is important to note that both the housing context and the household context matter in the destination outcome. For instance, Hochstenbach and Musterd (2021) explain that there is a relationship between unemployment and low-income households moving to the suburbs. This finding is in line with Clampet-Lundquist (2004), who suggests that households are less inclined to move longer distances if this disrupts their daily routines, and thus unemployed households face fewer difficulties when moving longer distances. Bocarejo et al. (2017) add that it is also a matter of income, as the poorest households have the most limited choice and are thus more likely to move to the most peripheral areas of the city. Our displacement framework is summarized in Table 2.

Table 2. A framework of displacement patterns.

	The excluded	The remaining	The suburbanized
Proximity	Employment centers	Social networks	Ø
Housing trajectory	Rental housing	Rental housing	Rental housing
Professional trajectory	Employment	Employed/Retired	Unemployed
Financial resources	Low-income	Low-income	Low-income
Cohabitation	Ø	Single/Couples	Ø
Children	Children	Children	Ø

Ø—No information identified in the literature.

Context

Our study focuses on Rotterdam, the Netherlands' second-largest metropolitan area, with a population exceeding 650,000. The Dutch housing market features a relatively high proportion of social housing and robust tenant rights, which reduce the risk of direct displacement. Rents in social housing are significantly lower than those in the private rental sector, and this system is intended for low-income households who struggle to find affordable options in the private market. While these protections make forced displacement relatively uncommon, it can still occur through social housing demolition or temporary housing contracts. More importantly, the availability of social housing is declining. Following the global financial crisis of 2008, housing policies increasingly shifted toward privatization, while the lack of a clear housing strategy led to stagnating supply amid rising demand (Boelhouwer, 2020). This shift caused rapid increases in private-sector housing prices and lengthy waiting lists for social housing. As both working- and middle-class households face growing challenges in securing affordable housing, gentrification continues to spread within and across cities (Booi, 2024; Janssen et al., 2024).

Rotterdam has the highest proportion of social housing among Dutch cities, which has long been a concern for policymakers. Its industrial heritage has hindered the transition to a post-industrial economy, resulting in higher unemployment, poverty, and outward middle-class mobility (Custers & Willems, 2024). The city's superdiverse population has further shaped local politics, contributing to a populist emphasis on safety since the rise of *Leefbaar Rotterdam* and Pim Fortuyn in the late 1990s (Van Ostaaijen, 2018). This focus on safety has influenced housing policy, leading to deliberate interventions aimed at triggering gentrification in low-income neighborhoods with high concentrations of minority residents. Municipal strategies have centered on promoting social mixing and enforcing regulations designed to limit the arrival of so-called "opportunity-poor" residents (Custers & Willems, 2024; Doucet & Koenders, 2018; Doucet et al., 2011). Rotterdam's local government justifies these policies by claiming that disadvantaged neighborhoods house too many opportunity-poor residents, while middle-class households lack options to stay due to the dominance of social housing reserved for low-income groups (Custers & Willems, 2024). These efforts often involve demolishing or privatizing social housing and have accelerated gentrification in recent years, particularly as measures targeting affluent families intersect with a tightening housing market (Arkins & French, 2024; Custers & Engbersen, 2022).

Data and methods

The use of sequence analysis in residential mobility studies is not new and has increasingly been applied in housing and urban studies to capture long-term residential trajectories as structured biographies rather than isolated moves. For example, Coulter and van Ham (2013) examined individual mobility biographies over 18 years, distinguishing between "desired movers," "undesired movers," and various forms of staying, thereby highlighting the importance of unmet moving desires in shaping housing careers. Additionally, Van Ham et al. (2014) used neighborhood histories to demonstrate the intergenerational transmission of poverty, showing how parental neighborhoods continue to influence residential outcomes decades later. Furthermore, Lee et al. (2017) applied sequence analysis in two ways: first, to classify the neighborhood trajectories of low-income U.S. households over two decades, identifying pathways of persistence, upward mobility, and cycling between neighborhood types; and second, to assess how subsidized housing shapes long-term residential opportunities when compared to carefully matched households. Collectively, these studies demonstrate that sequence analysis allows researchers to move beyond single-event approaches by visualizing, comparing, and clustering complex residential histories.

This paper draws on individual-level longitudinal register data provided by CBS Netherlands for the 2005–2022 period. Residential locations of individuals are determined on the January 1 each year. We identify 47,006 people with a 10-year residential trajectory within Rotterdam and the Rotterdam

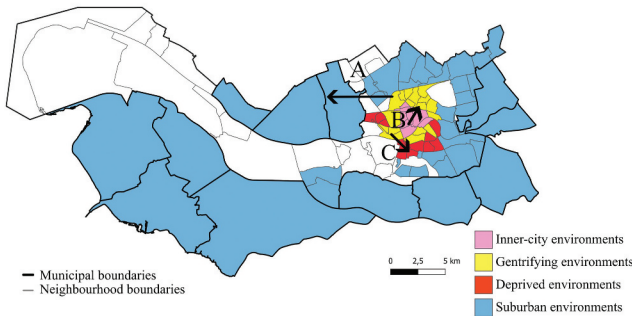
region. These trajectories represent the number of cases in this study and only include individuals who moved at least once during this 10-year time frame and who, at the start or at the end of the sequence, resided in a neighborhood defined by policymakers as gentrifying. Trajectories of individuals under 18, those living with parents, and those in institutional households are excluded from the analysis. Additionally, we omit trajectories that start or end outside the Rotterdam agglomeration to maintain clarity in the analysis. Longer-distance moves often involve different push and pull factors, such as employment opportunities or lifestyle changes, which are not directly comparable to the processes influencing shorter moves within a city. Additionally, focusing on intra-urban trajectories allows for a more detailed examination of local mobility patterns, which we consider important given that short-distance moves still account for the majority of relocations in Rotterdam (Janssen et al., 2024).

The sequences in our analysis span ten years, with start years ranging from 2005 to 2013 and end years from 2014 to 2022. For individuals who lived in Rotterdam or its agglomeration for more than 10 years, we randomly select a starting year to ensure a consistent 10-year trajectory. We apply multi-channel sequence analysis to classify these residential trajectories, assigning them to clusters that represent idealized patterns based on the order, duration, and timing of states. Two separate analyses are conducted: one for individuals moving into gentrifying neighborhoods, and one for those moving out of or within them.

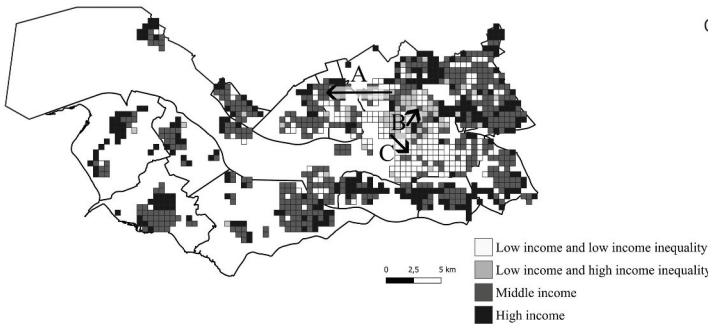
Each sequence captures two dimensions central to gentrification: the type of urban environment and the income level of the residential location. The first dimension categorizes residential environments into four types: inner-city, gentrifying, deprived, and suburban, which is based on Rotterdam municipal policy documents (2003, 2007, 2016). These classifications remain constant over time and are visualized in Figure 1A.

The second channel examines the income levels and income distribution within a residential location. The income level of a residential location is calculated within a 500-by-500-meter grid cell

1.1 Dimension 1 - Policy environments



1.2 Dimension 2 - Income environments



1.3 Hypothetical trajectories

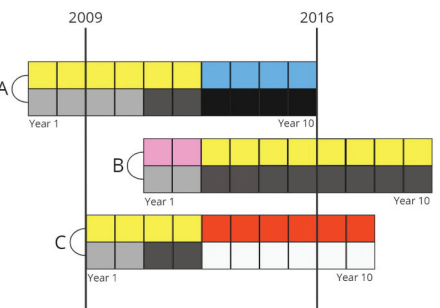


Figure 1. Spatial and temporal patterns in residential trajectories.

(i.e., 500 m square) using standardized household income data provided by CBS. Only squares with a population exceeding 20 are included. [Figure 1B](#) maps the income and income distribution in 2013. We classify 500 m squares into low, middle, and high-income categories based on the EUROSTAT definition of at-risk-of-poverty, which includes households earning up to 60% of the national median equivalized income. Squares in the top third of the poverty risk distribution are labeled low-income, those in the bottom third are high-income, and the remaining are middle-income. Additionally, we analyze income distribution within low-income areas to assess gentrification using the Gini index. Low-income squares with a Gini coefficient above the top third of Rotterdam's Gini coefficients are classified as low-income and high inequality. This distinction helps differentiate areas with high inequality experiencing early-stage gentrification from those with low inequality, indicating a stronger concentration of low-income households and fewer signs of gentrification.

It is important to note that the residential environments in the first channel do not change over time, while the income situation within the squares (i.e., the second channel) can fluctuate annually. This situation implies that the income dynamics of their neighborhood can change without an individual relocating, while the residential environment cannot. In the context of gentrification, a neighborhood may fall into a policy-defined category of “gentrifying,” yet the actual stage of gentrification can vary over time. To capture this temporal dimension, we combine the static policy classification with an annually updated income dimension. The income dimension indicates a neighborhood's position within the gentrification process, signaling whether it is in an early or more advanced stage in a given year. This approach enables us to incorporate the temporal dynamics of gentrification into the analysis. To summarize our empirical strategy for defining residential trajectories, [Figure 1](#) illustrates three hypothetical trajectories for individuals A, B, and C. The maps in [Figure 1.1](#) and [1.2](#) show the spatial movement of the individuals in light of the two dimensions, whereas [Figure 1.3](#) visualizes their residential trajectory. Individual A begins their sequence in 2007, residing in a gentrifying neighborhood marked by low income and high inequality. By year five of the sequence, the income level in that area rises to middle income. In the seventh year, 2013, this individual relocates to a high-income suburban environment, where they remain until year ten. Individual B starts their sequence in 2011, residing in an inner-city neighborhood with low income and high inequality. Two years into the sequence, they move to a gentrifying neighborhood with a middle-income level. Individual C begins their sequence in a gentrifying neighborhood in 2009, experiencing an increase in square income between years two and three. In year five (2013), they relocate to a deprived neighborhood marked by low income and low inequality.

Clustering

To create a typology of trajectories, we first calculate pairwise dissimilarities between all individual sequences across both dimensions using the TraMineR package in R (Gabadinho et al., 2011). We use the Longest Common Subsequence (LCS), a dissimilarity that explores all subsequences and returns the longest ones. Since we track individuals across various life stages and moves can occur at any time within the 10-year span, we prefer the LCS for its reduced sensitivity to sequence timing and its stronger focus on state distribution and sequencing differences (Studer & Ritschard, 2016). Using these dissimilarities, the sequences have been clustered based on the partitioning around medoids algorithm (PAM), which classifies data into a predefined number of groups based on the most representative observation, or medoid. The PAM algorithm minimizes the weighted sum of distances from the medoid to other observations within the same group (Studer, 2013). The optimal number of clusters was determined by evaluating ASW, PBC, and HC indices, aiming for theoretically meaningful clusters. The average silhouette width (ASW) measures an observation's average distance to others in its group versus its weighted distance to the closest group. The point biserial correlation (PBC) evaluates how well a data partition aligns with the original distance matrix. Hubert's C (HC) index compares the partition obtained to the best possible partition for the same number of groups

and distance matrix (Studer, 2013). An overview of the metric scores for the different cluster solutions is provided in [Appendix A1](#).

Socio-demographic characteristics

To distinguish the different types of individuals within each cluster, we compare a range of socio-economic and demographic characteristics. Because the analysis spans a 10-year period, individuals may experience multiple labor-market and life-course transitions within a single sequence. To keep the results clear, we focus on the key socioeconomic and demographic trajectories commonly discussed in gentrification research, as outlined in [Table 1](#) of the theoretical framework. Details on how these characteristics are operationalized are provided in [Appendix A2](#).

Results

In the results sections, we start by identifying and describing the residential trajectories clustered together in terms of the type of origin and destination neighborhoods which characterize them. We then relate these types of neighborhood trajectories to individual characteristics. Eventually, we synthesize these findings to identify typical profiles of gentrifiers and displaces expected from the literature on gentrification, as well as untypical categories of movers who also participated in neighborhood change in Rotterdam at the time of gentrification.

Descriptive analysis of residential trajectory clusters

The clusters are visualized in [Figure 2](#), showing the proportion of individuals in each cluster compared to the entire sample, which is displayed across the two dimensions—policy-defined and socioeconomic environment—for each year of the 10-year sequence. The horizontal axis represents time in years, while the vertical axis shows the proportion of individuals within each cluster. The top panels illustrate trajectories based on residential environment classifications from policy documents, whereas the bottom panels display the income states of residential locations throughout the sequences. Thus, the first series of plots illustrates the absolute distribution of sequences according to neighborhood morphology and location, while the second series reflects their distribution by neighborhood income levels. For example, for the approximately 5,000 individuals in the first cluster, the plots reveal that most began the sequence in a low-income gentrifying neighborhood and, after one to six years, predominantly relocated to a middle-income suburban environment.

Of the four clusters in which individuals *move away* from gentrifying neighborhoods, the majority (clusters 1, 3, and 4 representing 73% of moves out of gentrifying neighborhoods) involve individuals moving from low-income, high-inequality gentrifying neighborhoods (e.g., early gentrifying) toward suburban environments. Two of them correspond to a neighborhood upgrade: Cluster 1 contains individuals moving to middle-income suburbs, and Cluster 4 consists of those moving to high-income suburbs. By contrast, Cluster 3 comprises those moving to low-income, low-inequality (e.g., poverty-concentrated) suburbs. In Cluster 2 (27% of trajectories leaving gentrifying neighborhoods), individuals move out of early gentrifying toward poverty-concentrated deprived city neighborhoods. Therefore, only clusters 2 and 3 (together 46% of out-going movers) correspond to a neighborhood downgrade consistent with the displacement narrative.

Clusters 5, 6, and 7 represent individuals predominantly relocating within gentrifying areas. Specifically, individuals in Cluster 5 (57% of “within” trajectories and the largest cluster of all trajectories studied here) move within early gentrifying neighborhoods, while those in Cluster 6 (27% of “within” trajectories) transition from early gentrifying to middle-income gentrifying environments, implying a move to a more advanced gentrifying neighborhood. These two types of within moves (together 84% of “within” trajectories) are consistent with the gentrifier narrative. Individuals

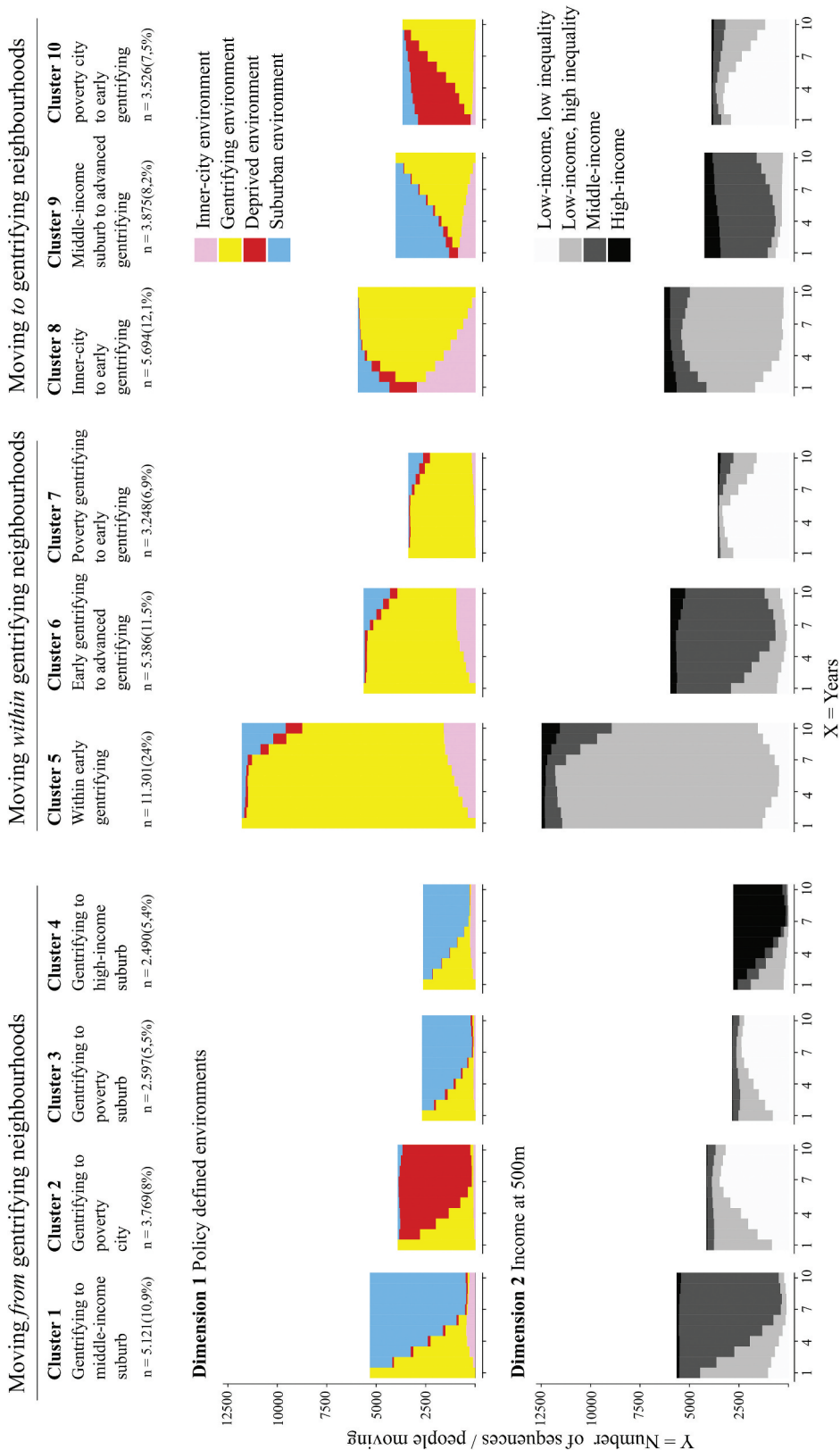


Figure 2. State distribution plots of residential trajectories to or from gentrifying neighborhoods.

in Cluster 7 (26% of “within” trajectories) move from poverty-concentrated gentrifying neighborhoods to early gentrifying neighborhoods.

Finally, Cluster 8 contains trajectories moving from the poverty-concentrated inner-city neighborhoods toward early gentrifying ones, while Cluster 9 moves from middle-income suburban environments toward the more middle-income gentrifying neighborhoods. These two types of upward moves (together, 73% of incoming residential trajectories) are consistent with the gentrifier narrative. However, Cluster 10 (27% of movers into gentrifying neighborhoods) depicts individuals who moved from deprived, poverty-concentrated neighborhoods toward early gentrifying neighborhoods.

Matching individual income with residential trajectories

Figure 3 depicts the average 10-year income distribution of each cluster (in blue) compared to the income distribution of all movers included in the analysis. Table 3 shows the socioeconomic and

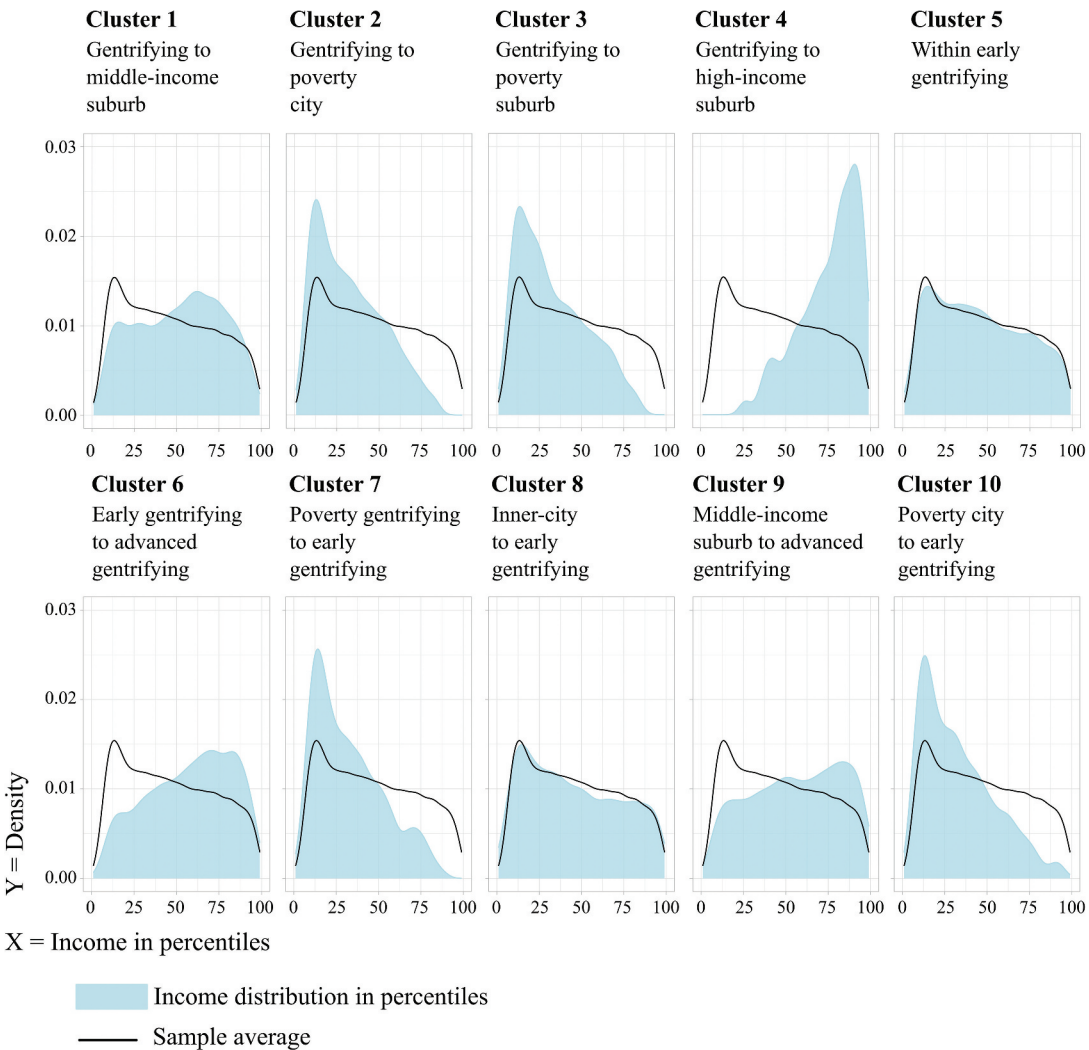


Figure 3. Income distribution density across clusters.



Table 3. Chi-square analysis of cluster socioeconomic and demographic characteristics.

	Moving from gentrifying neighborhoods					Moving within gentrifying neighborhoods			Moving into gentrifying neighborhoods		
	Cluster 1 n=5,121	Cluster 2 n=3,769	Cluster 3 n=2,597	Cluster 4 n=2,490		Cluster 5 n=11,301	Cluster 6 n=3,386	Cluster 7 n=3,248	Cluster 8 n=5,604	Cluster 9 n=3,875	Cluster 10 n=3,526
Total											
Career trajectory	44%	50.5%*	34.3%***	32.3%***	64.9%***	42.8%	56.1%***	31.3%***	42.5%	51.4%*	30.7%***
	19.7%	15.4%*	29.6%***	30.4%***	5.5%***	18.6%	10.6%***	28.9%***	19.2%	14.9%	33.1%***
	7%	4.0%***	6.8%	4.7%	2.5%***	9.7%***	8.0%	4.4%	9.5%*	6%	5.5%
	7.4%	6.6%***	5.8%***	10.6%***	4.3%***	7.8%***	6.2%***	11.3%***	5.8%***	8.9%***	8.5%***
	21.9%	23.5%	21.5%	22.5%	22.5%	21.1%	19%	24.1%	23%	18.1%	22.1%
Housing tenure trajectory	13%	8.5%**	18.4%	14.4%	4.7%***	15%	11.2%	19%	18.8%	9%	19%
	35.8%	41.7%	34.7%	32%	34.6%	36.9%	39.9%	34.3%	37.7%	29%	24.3%***
	21.6%	26.7%	10.8%***	12.2%*	43.2%***	20.8%	24.8%	12.6%*	18%	25.3%	9.6%***
	6%	4.3%	11.6%***	14.8%***	0	5.74%	2.6%***	9.6%	7.9%	2.8%	10.7%***
	23.6%	18.7%	24.5%	26.5%	17.4%	21.5%	21.3%	24.2%	21.5%	34%***	36.3%***
Cohabitation trajectory	18.2%	13.1%***	21.2%	23.8%	6.5%***	18.8%	14.8%	24.7%***	20.3%	15.8%	23.7%***
	20.5%	22.9%	17.6%	17.1%	23.7%	21.3%	24.8%*	15.2%	21.9%	18.8%	15.3%
	10.4%	7.9%	11.7%	10.4%	5.8%***	10.1%	8.5%	12.9%	10.1%	15.2%*	13.3%
	27.1%	36.2%***	20.5%***	24.9%	51.3%***	25.4%	27.6%	27.3%	21.8%**	24.6%	21.6%
	23.8%	19.9%	28%	23.7%	13%***	24.4%	24.3%	19.6%	25.8%	25.7%	26.1%
Family trajectory	44.4%	33.5%***	41%	40.4%	25.2%***	50.8%***	52.7%***	41.2%	52.3%***	51%	42.2%
	26.1%	38.3%***	23.3%	25.1%	47.5%***	23.7%	29.5%	18.2%***	24.4%	17.8%***	19.8%***
	5.7%	3.3%***	6.3%	3%	3%	5.2%	3.4%	8.7%***	4.6%	10.8%***	8.1%
	15.9%	18.6%	18.8%	18.5%	20.6%	14.9%	10%***	22%***	13.1%	11.4%*	20%
	7.7%	6.1%	10.6%***	9.7%	3.6%	5.5%	4.4%*	9.1%	6.7%	9.1%	9.6%*
Country of origin	63.4%	70.2%*	43.3%***	55%	80%***	63.3%	78%***	51.4%***	63.4%	73.8%***	46.7%***
	18.4%	12.4%***	30.4%***	24.8%***	6.3%***	18.8%	7.4%***	30.8%***	17.3%	10.9%***	31.6%***
	5.6%	5.6%	8.1%***	5.7%	4.8%	6%	5.4%	3.8%	5.6%	5%	5.2%
	12.6%	11.7%	18.2%***	14.4%	8.9%	11.8%	9.2%***	13.9%	13.6%	10.3%	16.5%***
	28.4%	34.3%***	24.1%	35.5%*	28.5%	25.6%	27.5%	31.9%	24.7%	32.6%	28.1%
Place of birth	4.7%	6.6%	19%*	3.8%	6.9%	4.0%	6.2%	2.7%	4.8%	8.3%***	2.3%***
	30.2%	29.3%	17.3%***	15.7%***	44.6%***	33.7%***	44.3%***	16.8%***	24.7%	32.9%	16.2%***
	36.6%	29.8%***	56.7%***	45%***	20%***	36.7%	22%	48.6%***	36.6%	26.2%***	53.4%***
	28%	28.3%	27.1%	28.7%	28.7%	27.1%	21.8%***	38.7%***	26.3	27.6	29.6%
	29%	26.9%	26.6%	28.9%	28.7%	30.8%	29.6	29.6%	28%	29.1%	29.6%
Start of sequence	43%	44.8%	46.4%	42.4%	42.6%	42.1	48.5%***	31.7%***	45.7%	43.2%	38.1%

 $\chi^2 - \alpha < 0.01^{**}, < 0.05^{**}, < 0.1^*$
 $\emptyset$ —No information | In blue: underrepresentation. In red: overrepresentation.

demographic profile of individuals in the clusters. A Chi-square test was performed on all variables to determine if the clusters contained above or below expected distributions for each variable category.

Among individuals *leaving* gentrifying neighborhoods in the period under study, we find a strong alignment between personal income and the socioeconomic environment of destination: those with the lowest income move to poor neighborhoods in the city (Cluster 2) or the suburbs (Cluster 3) in a downward trajectory. Individuals from historical migration waves (i.e., from Türkiye, Morocco, and Suriname) and renters of social housing (cf. Table 3) are overrepresented in these trajectories. They seem unable to accumulate the necessary capital to stay or move upwards as the neighborhood changes and are thus pushed toward poorer neighborhoods in the process of gentrification. By contrast, those with higher incomes move to wealthier suburbs (middle-income in the case of Cluster 1 and high-income in the case of Cluster 4), revealing a jointly ascending personal and neighborhood trajectory. Stable homeowners and new families are overrepresented in these clusters (Table 3), offering a picture of young urban couples accumulating wealth and power in the context of gentrification through homeownership and “cashing-in” to pursue their life-course trajectories in wealthier suburbs.

Among individuals moving *within* gentrifying neighborhoods, we find three very different income distributions. When moving within early gentrifying neighborhoods (Cluster 5), individuals resemble the general population of movers in terms of income, housing, and personal characteristics, with the exception of stable couples, who are overrepresented. Being the largest clusters of all, it makes sense to find an “average” profile of individuals composing it. It is interesting, however, to note that although neighborhood change is the main event happening in gentrifying neighborhoods, there is a large amount of permanence in the process as well, as illustrated by the movers of Cluster 5. Perhaps unsurprisingly, those in Cluster 6 (moving from early gentrifying to advanced gentrifying neighborhoods) earn more income than the population of reference. Their ascending trajectory in terms of neighborhood attainment coincides with an ascending individual trajectory of early life (as people entering a partnership and entering homeownership are overrepresented in these clusters). Finally, individuals moving from poverty-concentrated gentrifying neighborhoods to early gentrifying neighborhoods (Cluster 7) are characterized by lower incomes, more dissolutions of partnership, and households including children at some point of their trajectories, which suggests a more precarious set of residential trajectories within gentrifying neighborhoods.

Among individuals moving *into* gentrifying neighborhoods, those in Cluster 8 (moving from the inner city to early gentrifying neighborhoods) strongly resemble the individuals moving within early gentrifying neighborhoods of Cluster 5. In Cluster 9, where people move from middle-income suburban environments toward the more middle-income gentrifying neighborhoods, incomes are higher than the overall distribution, and people are more advanced in their life course. Retired individuals are overrepresented, along with empty-nest households, while households with children are underrepresented. There is also a higher rate of partnership dissolution, aligning with the narrative of single parents and older couples leaving the suburbs for a more intense social life in an urban environment. Finally, trajectories gathered in Cluster 10 (from poverty-concentrated neighborhoods to gentrifying neighborhoods) correspond to people with a lower individual income, on average, who are more affected by unemployment and more frequently were born abroad. In the next sections, we frame these findings around life-course transition and residential trajectories within the context of gentrification in Rotterdam and try to make sense of typical figures of gentrification among these varied profiles and trajectories.

Gentrifier trajectories

Clusters 5 and 8 consist of individuals relocating to or within early-stage gentrifying neighborhoods, where the income distribution is mostly low to middle income. Both have a significantly high proportion of individuals without children during the 10-year sequence, and Cluster 5 also contains an above-average proportion of individuals finishing their studies during the sequence. With a low to middle-income distribution, individuals of this group match the description of *early gentrifiers*: they

move into neighborhoods in the early stages of gentrification in the initial phases of their professional and household careers and have limited financial resources.

Another gentrifier trajectory is detected in Cluster 6, consisting of trajectories in which individuals move from early gentrifying neighborhoods to more advanced gentrifying neighborhoods. This cluster has a significant overrepresentation of individuals born in the Netherlands but outside the Rotterdam region, suggesting that while they have resided in Rotterdam's gentrifying neighborhoods for at least ten years, they are not originally from the area. Compared to Cluster 5, where individuals tend to move within early gentrifying neighborhoods, Cluster 6 is characterized by a notably higher proportion of individuals who are stably employed and significantly more likely to start cohabitating with a partner during the 10-year sequence, with a relatively affluent income distribution. These combined findings suggest that individuals in Cluster 6 are, on average, further along their household and professional careers than those in Clusters 5 and 8. Their move into a more advanced, gentrifying neighborhood likely reflects their growing economic capital and financial stability that is often experienced in later stages of life. At the same time, like the *early gentrifiers*, Cluster 6 also has an above-average share of households without children. These socio-spatial characteristics—moving to more advanced gentrifying neighborhoods, stable employment, beginning cohabitation, and not having children—align with the “*late gentrifier*” trajectory.

Cluster 9 represents the trajectories of individuals who moved from middle-income suburban environments toward more advanced gentrifying neighborhoods. These trajectories correspond to an above-average proportion of both retired and stable employed individuals. Additionally, individuals without kids are overrepresented, while these individuals starting a family are underrepresented. When combined with earlier findings showing that this cluster has a relatively high-income distribution (Figure 3), it appears to resemble the profile of an *empty-nest gentrifier*. The cluster also shows an overrepresentation of individuals born in the broader Rotterdam region, though not necessarily in the city itself.

It is important to note that these gentrifier trajectories are not equally prevalent in Rotterdam. The most common gentrifier group is that of the *early gentrifier*, comprising 17,000 individuals—over one-third of all analyzed trajectories (24% in Cluster 5 and 12% in Cluster 8). The *late gentrifiers* make up 12% of all trajectories analyzed (~5,300 individuals), while the *empty-nest gentrifiers* are less numerous, with 2,900 individuals (8% of all trajectories). The largest overall cluster in our sample consists of *early gentrifiers* relocating within already gentrifying neighborhoods. Additionally, we observe that *late gentrifiers* primarily move from early-stage to more advanced gentrifying areas. These findings suggest that gentrification is driven not predominantly by newcomers but by existing residents, indicating that the process was already well underway before their relocation. Finally, to assess temporal trends, we examined the prevalence of each cluster over time. Our findings indicate that individuals in the *late gentrifier* cluster were less likely (i.e., underrepresentation) to begin their sequence in the earlier years of our analysis, while more likely (i.e., overrepresentation) to start their sequence in the latter years of our analysis, implying that the late gentrifier trajectory has become more predominant over time.

Displacement trajectories

As for displacement, a notable trajectory appears in Cluster 3, in which low-income individuals leave gentrifying neighborhoods for poverty-concentrated suburban environments. Cluster 3 shows an above-average representation of individuals facing unemployment or retirement, with fewer individuals in stable employment, a higher proportion of individuals receiving rent subsidies, a lower proportion of homeowners, an above-average proportion of individuals born outside the Netherlands, a significantly high proportion of individuals born in Rotterdam, and a low proportion of those born in other Dutch regions. These findings imply that individuals moving to poverty-concentrated suburbs have a weak socioeconomic position compared to those relocating to middle- or high-income suburbs. Together with the finding that this cluster has a low-income distribution, we

consider this trajectory *the suburbanized displaced*. While middle-income to affluent individuals relocate to middle- or high-income suburbs to meet their new residential needs, low-income movers—often born in the city—appear to have moved to poverty-concentrated suburbs out of necessity. Fortunately, this category of displacement is one of the smallest clusters, with 2,600 individuals (5.5%).

The *excluded displaced* seems an appropriate characterization of Cluster 2, where individuals move out of gentrifying neighborhoods toward deprived neighborhoods with low income and low inequality. This cluster has a below-average representation of couples and an above-average representation of individuals relying on subsidized housing and those experiencing unemployment. It is somewhat surprising to find a high proportion of unemployed individuals in this cluster, given that literature typically associates the excluded displacement trajectories with employment-related relocations; the *excluded displaced* are expected to remain in the city due to employment obligations in the inner city, as opposed to the *suburbanized displaced*. We cannot confirm this in the context of Rotterdam. However, the significant overrepresentation of individuals born in the EU suggests that many are likely international labor migrants who may rely on unstable employment contracts. Further, given the high proportion of subsidized housing in both clusters, we also expect that the location of social housing plays a significant role in determining where individuals end up. Excluded trajectories represent 8% of the total, or ~3,800 individuals.

Cluster 7 primarily consists of individuals who moved from poverty-concentrated, gentrifying neighborhoods to early-stage gentrifying areas. Like clusters 2 and 3, this group has an above-average proportion of unemployed and foreign-born individuals, as well as a higher representation of retirees and single-person households. However, unlike clusters 2 and 3, Cluster 7 also contains a significantly higher proportion of individuals with children or those whose children have left the home. This finding supports our theoretical framework, which suggests that households with children and elderly individuals are less likely to relocate due to the potential disruption of their daily routines. Therefore, we argue that Cluster 7 exhibits characteristics of the *remaining displaced* trajectory. They represent 3,200 individuals (~7%). Important to note is that the *remaining displaced* trajectory was significantly overrepresented in the early years of this analysis (2005/2006/2007) and significantly underrepresented in the later phase (2011/2012/2012), implying that this cluster has become less predominant over time. This finding highlights the time trend in which gentrification prevails. Over time, low-income individuals face more difficulty entering gentrifying neighborhoods, as there is less affordable housing available to them when gentrification advances. The diminishing abilities of low-income households moving into gentrifying neighborhoods are widely referred to as exclusionary displacement.

In sum, we find similarities in the displacement trajectories: all three clusters have overrepresentations of unemployed and foreign-born individuals and underrepresentation of homeowners. Additionally, their income distribution is comparable. More interestingly, our analysis reveals differences between the clusters. For instance, clusters 3 and 7 contain above-average proportions of retired individuals, whereas Cluster 2 shows a higher representation of EU labor migrants. Additionally, Cluster 7 stands out for having an above-average proportion of individuals with children, unlike Clusters 2 and 3. These findings suggest that displacement trajectories are largely shaped by individuals with weak economic positions—such as low income and unemployment, highlighting their reliance on affordable housing.

Conclusion

This paper examines the residential trajectories associated with gentrifying neighborhoods, conceptualizing the diverse types of movers, their position in the life course, and their embeddedness within the context of Rotterdam's gentrification. In doing so, it situates the typical figures of gentrifiers and displaced within a life-course perspective. Using a multi-channel sequence analysis of individuals who moved either from or to gentrifying neighborhoods, we identify which types of trajectories prevail in

the gentrification process. We then analyze the socioeconomic and demographic characteristics associated with each cluster and compare these patterns with life-course transitions and gentrifier/displacee profiles proposed in the academic literature. This study addresses the following research question: How do the life-course trajectories of individuals moving into and out of gentrifying neighborhoods align with academic conceptualizations of gentrifiers and displaced residents?

Our analysis reveals that most residential trajectories in Rotterdam's gentrifying areas align with gentrifier profiles rather than displacement patterns. Of the 10 identified clusters, seven correspond to either gentrifier or displacement categories, with early gentrifiers being the most dominant, accounting for over one third of all trajectories. Alongside early gentrifiers, late gentrifiers and empty-nest gentrifiers also feature prominently during the studied period. On the displacement side, three distinct trajectories emerge: the suburbanized displaced, the remaining displaced, and the excluded displaced. These trajectories are shaped by individuals with weak economic positions, and their trajectories are most likely shaped by the location of social housing.

A key finding is that gentrifiers are often not newcomers but residents relocating within gentrifying areas. As gentrification progresses, this pattern becomes even more evident: late gentrifiers become more likely to move between neighborhoods at different stages of gentrification, reinforcing the concentration of affluent households within these areas. This internal reshuffling suggests that gentrification is not driven solely by external inflows but by a dynamic process of in-situ upgrading and continued mobility among existing residents. On the other hand, displacement primarily affects low-income households, especially international migrants who become increasingly excluded from gentrifying neighborhoods over time. These findings underscore the temporal dimension of gentrification and highlight that it is less about the direct displacement of working-class residents (Freeman et al., 2016, 2024) and more about the gradual transformation of formerly affordable neighborhoods, which steadily restricts access for the working class.

Discussion

Our findings offer critical insights into the nature of gentrification, challenging the common assumption that it is primarily about newcomers replacing long-term residents. Instead, our analysis shows that gentrification unfolds as a gradual process, driven by internal mobility and in-situ upgrading among gentrifiers. Over time, these patterns reinforce the presence of gentrifiers within the neighborhood, while displaced households face shrinking opportunities to enter or remain in these areas. The harms of gentrification, therefore, are less visible as sudden displacement and more evident in the slow erosion of housing access for low-income groups. Understanding this gradual nature is crucial for policymakers and housing advocates, as interventions must address not only direct displacement but also the long-term processes that limit housing opportunities for vulnerable populations.

This finding aligns with Hamnett's (2021) framework, which emphasizes that gentrification has evolved into a more subtle, long-term mechanism of neighborhood change. Similar to Hamnett, we observe that lower-income groups are not always directly displaced; instead, they and their successors encounter growing barriers to accessing housing in areas they once occupied. As Hamnett notes, being displaced from a neighborhood is distinct from being replaced through the gradual turnover of its population. Our results illustrate this replacement process in action, showing how shifts in in-movers gradually reshape the social composition of neighborhoods. At the same time, our analysis adds a micro-level dimension to Hamnett's framework. Whereas Hamnett highlights the "reshuffling" of middle- and upper-class households within the urban area, we identify a specific mechanism through which this occurs: affluent households not only move into gentrifying areas but also remain there by relocating within the gentrifying neighborhood, and by doing so, exclude the working-class from entry. Thus, gentrification is not just about new people moving in, but about incumbent affluent residents becoming more deeply embedded, thereby accelerating the exclusion of lower-income groups and solidifying the neighborhood's transformation. Understanding this gradual nature is crucial for

policymakers and housing advocates, as interventions must address not only direct displacement but also the long-term processes that limit housing opportunities for vulnerable populations.

That being said, this study has several limitations that warrant consideration. First, our analysis focuses exclusively on intra-urban residential moves, excluding relocations to and from areas outside the Rotterdam region. We adopted this scope to examine local residential trajectories in greater detail; however, it necessarily omits broader residential flows that also shape gentrification dynamics. For example, Janssen et al. (2024) show that Rotterdam increasingly attracts middle-class households from more gentrified Dutch cities, while other research highlights the growing role of transnational migrants in gentrification processes (e.g., Zhao, 2024). Excluding these flows may therefore underestimate the extent to which gentrifiers are newcomers to gentrifying neighborhoods. Nevertheless, given that most residential moves are short distance, including in Rotterdam (Janssen et al., 2024), our finding that the majority of gentrifiers in gentrifying neighborhoods are not newcomers remains robust and meaningful.

A second limitation concerns the population included in our analysis. We focus exclusively on individuals who moved during the study period, thereby excluding non-movers who may also experience significant gentrification pressures. In the Dutch context, relatively strong tenant protections reduce the likelihood of eviction due to rent increases. However, households may still wish to relocate but are unable to do so because affordable alternatives are scarce. This dynamic could partly explain why gentrifier clusters outnumber displacement clusters by more than two to one in our findings. It is important to recognize that remaining in place is not simply the absence of mobility; rather, it is often an active, resource-intensive strategy shaped by both agency and constraint (Coulter et al., 2016). Incumbent residents may attempt to resist displacement through coping mechanisms such as taking on additional work (Newman & Wyly, 2006). By concentrating on movers, we align with a body of work that documents displacement through mobility (Ding et al., 2016; Hochstenbach & Musterd, 2018), but we are unable to capture experiences of in-situ adaptation and immobility under gentrification pressure. Finally, a limitation of our study concerns the temporal structure of the analysis. We use randomly selected 10-year residential trajectories within the 2005–2022 period rather than a single fixed time frame. This approach was chosen to maximize the number of observations and to capture how gentrification patterns evolve over time. However, it introduces variability in the starting year of individual sequences, meaning that neighborhood classifications may differ across sequences and even within the same individual's trajectory. While we tested longer periods and fixed intervals, the resulting clusters were highly compatible with those derived from 10-year sequences, suggesting that our findings are robust. Nevertheless, the random selection of starting points may obscure certain dynamics, such as individuals moving back and forth between gentrifying areas or changes in neighborhood status without physical relocation.

These limitations also point to important avenues for future research. One promising direction would be to trace the long-term residential and financial trajectories of gentrifiers themselves, rather than focusing solely on neighborhood-level change. Such an approach could illuminate how gentrification unfolds across space and time, how gentrifiers accumulate housing wealth, and whether profits from owner-occupied homes in gentrifying neighborhoods are leveraged to purchase property elsewhere, potentially contributing to suburban, rural, or spillover gentrification (Hochstenbach & Boterman, 2015; D. P. Smith, 2002). Following gentrifiers through different life stages would further clarify how early entrants become long-term or family-oriented residents and how their mobility shapes broader patterns of social mobility and secondary-city gentrification.

Despite these limitations, this study provides important insights into the dynamics of gentrification and residential mobility within Rotterdam. By focusing on detailed intra-urban trajectories, it highlights the significant role of local movers in gentrifying neighborhoods and challenges assumptions that gentrification is driven primarily by newcomers moving into the neighborhood. In doing so, the study contributes to a more nuanced understanding of how gentrification unfolds through everyday residential mobility, offering a valuable empirical foundation for future research and policy debates on urban inequality and housing affordability.

Note

1. Although we recognize recent research on middle-class displacement and gentrification spillovers (Janssen et al., 2024; Martin et al., 2025; Ocejo, 2019), our study focuses on the displacement of low-income households, given the relatively early stage of gentrification in Rotterdam (cf. Custers & Engbersen, 2022; Custers & Willems, 2024; Janssen et al., 2024).

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Data availability statement

The raw data used in this paper belong to Statistics Netherlands, and are restricted to a confidentiality agreement. Hence, sharing the data is prohibited to safeguard the privacy of the registered Dutch population.

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Appendix A1. Overview of cluster metrics

Quality scores	PBC	ASW	HC		PBC	ASW	HC4
<i>Moving to gentrifying neighborhoods</i>				<i>Moving from/within gentrifying neighborhoods</i>			
Cluster2	0.43	0.24	0.23		0.46	0.28	0.22
Cluster3	0.54	0.28	0.16		0.59	0.31	0.14
Cluster4	0.52	0.24	0.17		0.56	0.30	0.15
Cluster5	0.54	0.24	0.15		0.60	0.31	0.12
Cluster6	0.56	0.27	0.12		0.61	0.33	0.09
Cluster7	0.51	0.23	0.14		0.61	0.35	0.09
Cluster8	0.51	0.26	0.13		0.57	0.33	0.10
Cluster9	0.49	0.25	0.13		0.58	0.35	0.08
Cluster10	0.49	0.26	0.11		0.59	0.37	0.07
Cluster11	0.49	0.27	0.11		0.57	0.35	0.07
Cluster12	0.48	0.27	0.11		0.55	0.33	0.07
Cluster13	0.45	0.25	0.12		0.54	0.33	0.07
Cluster14	0.45	0.24	0.12		0.53	0.32	0.07
Cluster15	0.43	0.22	0.12		0.52	0.31	0.07
Cluster16	0.44	0.23	0.11		0.52	0.31	0.07
Cluster17	0.43	0.23	0.11		0.52	0.31	0.07
Cluster18	0.42	0.23	0.11		0.52	0.32	0.06
Cluster19	0.43	0.24	0.10		0.51	0.31	0.06
Cluster20	0.42	0.24	0.10		0.48	0.29	0.07

Appendix A2. Operationalization of socioeconomic and demographic trajectories

This appendix provides a detailed overview of how the socioeconomic and demographic trajectories used in the analysis were constructed. For each domain, we outline the categories applied and the criteria used to classify individuals' 10-year sequences.

For professional trajectories, we categorize individuals' employment sequences into: (1) stable employment throughout the ten years, (2) experiencing at least one unemployment period, (3) transitioning from student to non-student status, and (4) retired (either entering retirement or being retired for the entire period). All additional trajectories are labeled "other."

For housing transitions, we focus on three types: owner-occupied, rental, and subsidized rental housing (a proxy for social housing). Housing trajectories are classified as: (1) stable tenant, (2) transition to homeownership, (3) stable homeownership, and (4) stable subsidized housing (rent subsidies throughout the 10 years). All other housing patterns, including those with frequent changes, are categorized as "other."

The remaining characteristics include partnership status, children, income, and place of birth within and outside the Netherlands. Partnership and children are tracked by transitions, with individuals experiencing more than two transitions in the 10-year period classified as "fluctuation." Income is measured as the average equivalized household income over 10 years, segmented into quantiles based on the Netherlands' overall income distribution.

Country of birth is categorized as follows: (1) Netherlands; (2) countries with historical migration waves to the Netherlands (Suriname, Morocco, Türkiye, Dutch Antilles); (3) European Union countries; and (4) other non-European Union countries. Place of birth is classified into (1) Rotterdam, (2) the Rotterdam region, (3) other municipalities in the Netherlands, and (4) locations outside the Netherlands.