



Neighbor change and social connectedness for older adults in Barcelona

Pilar Zuera, Iñaki Permanyer, Antonio López-Gay, Marc Ajenjo & Albert Esteve

To cite this article: Pilar Zuera, Iñaki Permanyer, Antonio López-Gay, Marc Ajenjo & Albert Esteve (2026) Neighbor change and social connectedness for older adults in Barcelona, Journal of Urban Affairs, 48:6, 1919-1935, DOI: [10.1080/07352166.2025.2513977](https://doi.org/10.1080/07352166.2025.2513977)

To link to this article: <https://doi.org/10.1080/07352166.2025.2513977>



© 2025 The Author(s). Published with license by Taylor & Francis Group, LLC.



[View supplementary material](#)



Published online: 17 Jun 2025.



[Submit your article to this journal](#)



Article views: 1274



[View related articles](#)



[View Crossmark data](#)



Citing articles: 1 [View citing articles](#)



Neighbor change and social connectedness for older adults in Barcelona

Pilar Zuera^a, Iñaki Permanyer^{a,b}, Antonio López-Gay^{a,c}, Marc Ajenjo^{a,c}, and Albert Esteve^{a,c}

^aCentres de Recerca de Catalunya (CED-CERCA); ^bICREA; ^cUniversitat Autònoma de Barcelona

ABSTRACT

This study examines the interaction between aging and urban change to identify urban areas where older adults may experience low social connectedness, based on the principles of propinquity and homophily in the formation of social ties. We develop an indicator that operationalizes previous findings on the impact of urban change on older adults' social connectedness, a predictor of health and well-being. Using comprehensive administrative data from the population register of Barcelona (Spain), we construct a Neighbor-Centered Index of Distinctiveness (NCID) for living areas. The NCID is computed from four variables available in the population register—age, sex, place of birth, and years of residence in the municipality, and estimates the degree of distinctiveness of older adults with the residents in each of the 1,068 census tracts in Barcelona for 2011 and 2021. The method involves defining areas and distances and calculating the NCID as the sum of the contributions of different groups. Results show the heterogeneity of areas in Barcelona and how NCID has changed over the last decade due to urban changes related to demographic dynamics, gentrification, and tourism. As expected, NCID increased with age and in 2021. Our findings provide valuable insights for policymakers seeking to promote social connectedness.

KEYWORDS

Urban health; social capital; community

Introduction

Social connectedness is a broad, multidimensional concept that refers to the structure, function, and quality of an individual's relationships with others, their sense of belonging, and their engagement in social networks, and has important implications for health (Holt-Lunstad, 2021). Social connectedness operates through various mechanisms at different levels within the social-ecological model: intrapersonal, interpersonal, organizational, environmental, and policy (Cornwell & Waite, 2009; Hawkey & Cacioppo, 2010; Holt-Lunstad, 2021; Umberson & Karas Montez, 2010). A growing body of evidence supports the relationship between social connectedness and health, highlighting objective and subjective indicators of low social connectedness as risk factors for cognitive decline, morbidity and mortality (Cacioppo & Cacioppo, 2014; Cacioppo et al., 2015; Holt-Lunstad, 2022; Holt-Lunstad et al., 2015). The risk of low social connectedness may be exacerbated in later life and in large cities (Cramm et al., 2013; Holt-Lunstad, 2022). Due to changes in social roles, health, and mobility, older adults tend to concentrate their lives in their homes and immediate surroundings, where the informal neighborhood networks shape their everyday life facilitating social interactions and enhancing their well-being (Bruggencate et al., 2018; Gardner, 2011). However, the interplay of aging and urban change, which encompasses the current socioeconomic and demographic dynamics unfolding in cities, may affect the social environment, potentially eroding older persons sense of belonging and neighborhood

CONTACT Pilar Zuera  pzuera@ced.uab.es  Universitat Autònoma de Barcelona, Carrer de Ca n'Altayó, Edifici E2, Bellaterra 08193, Spain.

 Supplemental data for this article can be accessed online at <https://doi.org/10.1080/07352166.2025.2513977>

© 2025 The Author(s). Published with license by Taylor & Francis Group, LLC.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent.

identification reducing these interactions (Blokland et al., 2023; Cotterell et al., 2018; Finlay & Kobayashi, 2018; Lewis & Buffel, 2020; May & Muir, 2015). Cumulative evidence suggests that improving the sense of belonging and neighborhood identification can have a positive impact on people's well-being and social connectedness (Cramm & Nieboer, 2015; Cruwys et al., 2022; Fong et al., 2021). As this may be a modifiable factor, identifying those areas where older adults may experience low social connectedness is of political interest. This paper presents a tool that can be useful for identifying those areas.

The interrelated influence of personal and neighborhood characteristics on social connectedness has often been approached through qualitative research, which provides deeper understanding of the experiences that shape older adults' social connectedness in their neighborhoods but lacks a population-based scope. On the other hand, quantitative studies analyze indicators that measure social connectedness and individuals' perceptions of belonging to their local community, typically obtained through surveys. Respondents are asked about their feelings of loneliness and social isolation, the number, frequency and quality of social contacts, or their level of agreement with statements such as "I feel like I belong to this neighborhood," "I think of myself as similar to the people that live in this neighborhood," among others. Survey data provides flexibility and diverse information tailored to specific research objectives. However, drawbacks include potential bias, resource-intensive implementation, and limitations in sample size that compromise high-detailed analysis. In contrast, register data collected for administrative purposes provides comprehensive cost-effective samples with objective information, enabling detailed analysis at the territorial level and over time.

In this paper, we develop and implement an indicator that measures how older adults living in a specific area differ from their neighbors based on their demographic profiles, using administrative data from the population registry. This source is both comprehensive and underutilized, offering objective insights that may be of interest to researchers, public agencies, and policymakers (Voukelatou et al., 2021). We refer to this indicator as the Neighbor-Centered Index of Distinctiveness (NCID). Our population of interest is people aged 65 and older living in Barcelona, the second largest city in Spain. We identify areas in Barcelona with low and high NCID. Lower NCID values indicate more resemblance, which, according to quantitative and qualitative evidence, may result in higher social connectedness among older adults, while higher NCID may result in reduced social connectedness. The identification of areas in Barcelona with low and high NCID scores facilitates the interpretation of high NCID scores as areas where older adults may be less connected to their neighbors.

This study sheds light on the interactions between aging and urban change in relation to social connectedness of older adults in Barcelona. Additionally, it aims to contribute to the fields of environmental gerontology, sociology, community health and urban studies by proposing an innovative way of using comprehensive administrative data to study social community processes influenced by both individual and structural characteristics (Sampson, 1988). Following the literature and limited by data availability, we use age, sex, origin and length of residence in the city to assess the distinctiveness of older adults and their neighbors. Other relevant information at the individual level is not available. However, the indicator design allows for the use of other variables (e.g., race/ethnicity, education, income, etc.) in its calculation, as well as other neighbor-referenced population based on other variables (e.g., age and education, or sex and ethnicity) depending on the research scope, which enhances its usability.

Background

Social connectedness in the community

Social connectedness and an individual's integration into communities depend on the presence of both strong and weak ties (Granovetter, 1983). Strong ties exist between family members and close friends who have frequent interactions, while weak ties refer to interactions with distant social

relationships, such as those with neighbors, that occur less frequently. Research has proposed mechanisms through which weak ties can enhance social connectedness (Lam et al., 2023; May & Muir, 2015) highlighting the importance of having a diverse network of both strong and weak ties for older adults' well-being (Bruggencate et al., 2018). However, community ties are not static.

The interaction between aging and urban change may affect the social connectedness of older adults through their community social ties. Studies in various international contexts have accumulated evidence supporting this hypothesis. For urban residents, community integration was associated with both length of residence and community stability (Sampson, 1988). Long-time residents in areas with high population turnover may experience a loss of neighborhood identification and a sense of isolation (Buffel et al., 2013). Finney and Jivraj (2013) found that the perception of neighborhood belonging was influenced by local population dynamics capturing a more complete picture of population change than immigration alone. Residential stability has individual and structural effects. Sampson (1988) found that length of residence was positively associated with local social ties, community attachment, and participation in local social activities. Additionally, the average level of friendship in the community was found to be correlated with an individual's local social ties.

Residential proximity provides opportunities for interaction which is a prerequisite for the formation of social ties. However, propinquity in itself may not be sufficient to facilitate encounters between older adults and their neighbors (Fuhse & Gondal, 2024). Demographic resemblance also creates meeting places for people who repeatedly attend the same places, attracted by similar interests or needs (Verbrugge, 1977). Therefore, demographic resemblance enhances the opportunity for "meeting," but also for "mating," according to the well-established principle of homophily, which posits that individuals tend to form ties with similar others (McPherson et al., 2001; Verbrugge, 1977). Demographic resemblance in terms of age, gender, and origin, as well as similarity of other cultural or socioeconomic variables such as race, ethnicity, religiosity or education profiles is one of the main mechanisms of social ties formation that vary according to the type of relationship (Fuhse & Gondal, 2024). There is abundant quantitative evidence of the significance of the demographic resemblance in the formation of less close ties in informal contexts, such as acquaintances in neighborhoods (McPherson et al., 2001). Qualitative research on aging in a diversity of contexts (Lewis & Buffel, 2020; May & Muir, 2015; Morgan et al., 2021; Yen et al., 2012) has also shown that individuals tend to socialize and feel more connected to others who share similar characteristics, such as sex, age, and cultural background. In this paper we operationalize the concept of distinctiveness based on demographic profiles following the principles of propinquity and homophily to identify living areas where older people may be more distinct from their neighbors and feel less connected in their community.

Aging and urban change

Aging is usually associated with changing roles, declining health or functional capacity, reduced mobility, a loss of close social ties, and a reduction in the frequency and intensity of other social and family relationships (Phillipson et al., 2002). These changes may reduce the diversity of everyday social spaces and concentrate daily living in the local area of residence. As a result, the neighborhood becomes more central in older adults' daily lives and their main (social) activities take place in their closest environment.

Besides changes associated with the life cycle and aging, aging in a large and heterogenous city in constant transformation may have additional implications for social connectedness (Buffel et al., 2012; Cotterell et al., 2018; May & Muir, 2015). The high levels of residential mobility, rapid population turnover, foreign immigration, transient populations, and tourism are transforming the social fabric and the common landscapes (Lager et al., 2013). Neighbors and businesses are being replaced by new age and socioeconomic groups and commercial activities transforming the meeting places of older people. These changes may erode their sense of belonging and identification with the neighborhood and community (Bailey et al., 2012; Buffel et al., 2014; Lewis & Buffel, 2020; Sampson, 1988) and affect their quality of life and health (Anguelovski et al., 2021; Cramm & Nieboer, 2015; Prieto-Flores et al.,

2011; Young et al., 2004). The demographic dynamics driving these spatial changes are heterogeneous and vary in distinct areas.

Urban change in Barcelona

Three major processes are currently shaping the human landscape in Barcelona: international migration, the expansion of exclusive neighborhoods—closely linked to increasing difficulties in accessing housing—and a strong tourist activity. Migration has been a key driver of urban development in Barcelona since its industrial boom, as is the case in most large urban areas. However, the last quarter of the 20th century was characterized by demographic stability, with limited migratory flows. This pattern changed at the turn of the 21st century with the onset of a pronounced migration cycle that continues today, despite interruptions following the 2008 financial crisis and the COVID-19 pandemic. The intensity of this most recent cycle parallels the two peaks of the 20th century, although it is characterized by the predominance of international migrants among the new arrivals (Domingo & Bayona-i-Carrasco, 2024). The settlement of international migration within the city is highly diverse (Galeano & Bayona-i-Carrasco, 2018). For example, in the Raval neighborhood, located in the historic center, 60% of the residents were foreign-born in 2021. In contrast, in more peripheral neighborhoods, such as Font d'en Fargues, only 10% of residents were born outside of Spain. Furthermore, the profile of migrants arriving in the city is becoming increasingly diverse. While less-educated populations continue to settle in peripheral neighborhoods, the central areas are experiencing an influx of highly educated foreign residents (López-Gay et al., 2020).

Access to housing has become a complex issue in many neighborhoods of Barcelona, like in other central European cities. This situation is characterized by a deterioration of the housing situation and is contextualized within a general expansion of gentrification processes from specific areas in the center to many other neighborhoods throughout the 2010s (López-Gay, Sales-Favà, et al., 2021). These processes can result in the displacement of populations with lower socioeconomic status and longer periods of residence to more distant areas from metropolitan centers by new neighbors with higher incomes (Hochstenbach & Musterd, 2018). Moreover, in some southern European cities such as Barcelona, transnational migration for lifestyle reasons is becoming increasingly important, leading to more transitory residential trajectories (Hayes & Zaban, 2020). Neighborhoods are experiencing increased population turnover, which can weaken the construction of community and support networks (Brollo & Celata, 2022; Massey, 2005; Meier & Frank, 2016). The increasing difficulty in accessing housing, combined with a lower prevalence of homeownership and the role of international migratory flows, has been accompanied by a notable rise in residential instability in Barcelona. This trend is reflected in more frequent residential mobility, particularly in the central areas of the city (López-Gay et al., 2023). In some neighborhoods, such as the Gothic quarter, more than half of the residents have lived in their current dwelling for less than five years. In contrast, in other neighborhoods, 70% of the population has lived in the same residence for more than 10 years.

During the 2010s, urban tourism has significantly increased in many European cities, including Barcelona, which is among the most visited cities internationally. The academic literature on the sociodemographic and urban impacts of tourism activity has also grown considerably. These contributions highlight the conversion of some residential houses into tourist or temporary accommodations, which has increased pressure on the housing market and impacted local communities (Cocola-Gant & Gago, 2021). The transformation of businesses oriented to tourists rather than residents, the changing use of public spaces, and the deterioration of mobility are also highlighted (Cocola-Gant, 2018; Gotham, 2005). Finally, it has been observed that these tourist environments have undergone sociodemographic transformation, including an increase in highly transient adult transnational residents with high incomes, which has negatively impacted the local population of all ages, including the older population (López-Gay, Cocola-Gant, et al., 2021). As a result of these transformations, older adults may have lost connections with their neighbors due to death or migration and may no longer be known to them.

These dynamics, while characteristic of various Southern European cities, have reached extraordinary intensity in Barcelona over the past decade, coinciding with the progressive aging of its population. The sizable cohorts born between 1950 and 1975 are now transitioning to the top of the age pyramid, a process further intensified by the city's historically low fertility rate. Approximately 22% of the population is over the age of 65 (more than 350,000 individuals). Moreover, over 40% of the population is already aged 50 or older, underscoring a demographic shift that will likely deepen in the coming years (Donat, 2019). These groups are particularly impacted by these sociodemographic shifts, often facing greater challenges in adapting to the evolving social and urban environment (Den Hoed & Russo, 2024).

Objective

The aim of this study is to investigate the interaction between aging and urban change in the city of Barcelona, using an indicator that measures how similar older adults are to their neighbors in a living area. This indicator enables the identification of areas where older adults are less likely to find others with similar demographic profiles. According to the literature on the formation of social ties and the evidence on older adults' feelings of social connectedness with their neighbors, this could influence older adults' social connectedness within their local community. The NCID is computed from four variables available in the population register (age, sex, place of birth and years of residence in the municipality) for each of the 1,068 census tracts of the municipality.

Data and methods

We use data from the Municipal Population Register of Barcelona in 2011 and 2021 to compute an indicator for specific groups of older population at the census tract level and we use maps to visualize change across age, cohorts, and over time.

The dataset contains aggregated information at the census tract level on four variables: sex, age, origin, and length of residence in the city. These variables can take the following values: Sex: "Women" and "Men"; Age: "0–4," "5–9," "10–14," "15–19," "20–24," "25–29," "30–34," "35–39," "40–44," "45–49," "50–54," "55–59," "60–64," "65–69," "70–74," "75–79," "80–84," "85+"; Origin distinguishes between people born in "Spain," or "Abroad"; Length of residence indicates the number of years since the first arrival in Barcelona in four intervals: "less than 1 year ago," "1 to 5 years ago," "6 to 15 years ago" and "more than 15 years ago." Data was provided by the City Council of Barcelona.

The Population Register presents the limitation of having few variables (none of which are socio-economic), but the advantage of providing an extensive geographic resolution. In this study, the unit of analysis is the census tract.

Barcelona is a central city in a Metropolitan Region with a population of approximately 5.5 million inhabitants. The city itself is home to about 30% of its population, or 1.65 million inhabitants. It is organized into 1,068 census tracts, each with an average population of about 1,500 people. Census tracts are territorial divisions designed for the proper functioning of political elections.

Given the high and homogeneous density of the population in Barcelona, there are few notable differences in the size of each census tract. The only exceptions are in the peripheral areas of the city, where the topography and the presence of a large forest park to the north and west of the city result in larger census tracts.

To enhance the comprehensibility of the empirical results, we have included two maps. Appendix 1 contains the names of districts and neighborhoods. Appendix 2 presents descriptive indicators for each variable used in the analysis, along with a final map showing the average per capita income in each census tract (Instituto Nacional de Estadística).

The Neighbor-Centered Index of Distinctiveness (NCID)

The NCID addresses the following question here: When an old person goes out in the street, how similar or different are the other people one might find in the area where one lives? To answer this question, we proceed in three steps. First, we define the area of residence. Here, we use the 1,068 census tracts that partition the municipality of Barcelona. In 2021, the mean number of individuals living in those census tracts was 1,555, but the entire distribution ranges between 698 and 8,690 individuals. However, in 88% of the census tracts, there are between 1,000 and 2,000 individuals. Second, we define how to measure the degree of distinctiveness among pairs of individuals. Third, we define an averaging operator to assess the average demographic distance among the individuals living in each census tract.

Distance functions

To assess the degree of distinctiveness we focus on distance between vectors, or difference between individuals, and compare their characteristics along the following four indicators: “sex,” “age,” “origin,” and “length of residence” in Barcelona. The values of such variables for a generic individual “ i ” will be written as a four-dimensional vector

$$c_i = (c_{i1}, c_{i2}, c_{i3}, c_{i4})$$

For instance, for a woman, aged 72, born in Spain and who arrived to Barcelona 18 years ago, one has that c_{i1} = “woman,” c_{i2} = 70–74, c_{i3} = “Spain,” and c_{i4} = “More than 15 years.” Since the variable “sex” takes two values, “age” 18 values, “origin” 2 values and “length of residence” 4 values, the number of classes of individuals (or individuals’ profiles) that can be generated from these four variables equals $2 \times 18 \times 2 \times 4 = 288$, a number that we will denote by m .

Now, given any two individuals i and j , the degree of distinctiveness among them will be measured through

$$\delta(c_i, c_j) = \left(\sum_{k=1}^4 d_k(c_{ik}, c_{jk}) \right) / 4$$

where $d_k(\cdot, \cdot)$ is a function measuring how distant the values c_{ik} and c_{jk} are. Thus, $\delta(c_i, c_j)$ is simply the average of the distance between individuals i and j along the 4 dimensions considered in this paper. The construction of the $d_k(\cdot, \cdot)$ distance functions is indicator-specific. Now we explain how they have been defined one by one.

Sex. In this case, we consider that two individuals belonging to the same sex are at distance 0, while those belonging to different sexes are at a distance of 1. That is:

$$d_1('Man', 'Man') = d_1('Woman', 'Woman') = 0 \text{ and}$$

$$d_1('Woman', 'Man') = d_1('Man', 'Woman') = 1.$$

Age. Age is reported in five-year intervals: 0–4, 5–9, 10–14, $\dots$, 80–84, 85+. To measure distances between age groups, we take the midpoint of each interval, that is: 2.5, 7.5, 12.5, $\dots$, 82.5. For the last age group (85+), we take the value of 87.5. These mid-points will be labeled as a_i . Given any two age groups with mid-point ages a_i, a_j , we define the distance between them as

$$d_2(a_i, a_j) = |a_i - a_j| / M$$

where M is the highest possible distance between two age groups (in our setting: $87.5 - 2.5 = 85$). In this way, two individuals with the same age group are at distance 0, and such distance increases to the highest possible value of 1 whenever we compare a pair of individuals with the highest and lowest possible ages.

Origin. In our dataset, we use 2 categories for the place of birth: “Spain” versus “Abroad.” When two individuals belong to the same category, they are at distance 0, while those from different categories are at a distance of 1 (as in the case of sex).

Length of residence. The length of residence comes from the time since first arrival to Barcelona, which is measured in four broad time intervals. To measure the distance between them, we take the mid-point of each of the intervals, which will be referred to as t_i . For those who arrived to the city less than a year ago, the mid-point is defined as 0.5. For those who arrived between 1 and 5 years ago, 6 and 15 years ago or more than 15 years ago, the corresponding mid-points (t_i) are defined as 3, 10 and 20. Given any two mid-point times since arrival to Barcelona (t_i, t_j) we define the distance among them as

$$d_4(t_i, t_j) = 1 - \frac{\min\{t_i, t_j\}}{\text{Max}}$$

where “Max” is the highest value that the time variable can take (in our setting, this is equal to $20 - 0.5 = 19.5$).

Because of the way in which they have been constructed, the different distance functions $d_k(\cdot, \cdot)$ range between 0 and 1, and go in the same direction (that is: they take the minimal value of zero when the two outcomes coincide, and take increasingly higher values (never above 1) when the two outcomes are increasingly different. This ensures that the averaging function $\delta(c_i, c_j)$ presented above is well-defined and always takes values between 0 and 1.

Average distance indicators

Having defined how distant any two individuals are, for each census tract we define the following index

$$D = \sum_{g=1}^m \sum_{h=1}^m p_g p_h \delta(c_g, c_h)$$

where p_g, p_h is the proportion of individuals belonging to the class of individuals “g” and “h,” respectively, in the census tract we are working with. Recall that $m = 288$ is the number of classes of individuals that can be generated according to the values of the 4 indicators we are using to compare individuals. D is an “average distance index,” that measures the average expected difference between two individuals picked at random from the corresponding census tract. Formally, this is equivalent to the well-known Gini index of economic inequality, which measures the expected income difference between two randomly taken individuals (in that setting, the distance function is simply $d_{ij} = |x_i - x_j|$, where x_i, x_j are the incomes of individuals “i” and “j,” respectively). By construction, D would take a value of 0 whenever all individuals in the census tract were exactly the same according to our four indicators (something that does not occur in any of them), and takes increasingly higher values whenever the profiles of the inhabitants in that census tract are more heterogeneous. Interestingly, the average distance index D can be broken down as follows

$$D = \sum_{g=1}^m \sum_{h=1}^m \delta(c_g, c_h) p_g p_h = \sum_{g=1}^m p_g \left[\sum_{h=1}^m \delta(c_g, c_h) p_h \right] = \sum_{g=1}^m p_g D_g = \sum_{g=1}^m C_g$$

where p_g is the proportion of individuals belonging to group g , D_g is the average distance between the individuals of group g with respect to the remaining groups, and $C_g = p_g D_g$ denotes the contribution of group g to the overall distance index D . Taking advantage of this decomposition, we define our Neighbor-Centered Index of Distinctiveness (NCID) as

$$\text{NCID} = \sum_{g \in H} \frac{C_g}{m}$$

where H is the set of classes of individuals that are classified as being “old.” We use older age groups as the neighbor-reference categories (65–74, 75–84, 85+). The $NCID$ takes values between 0 and 1 where lower values denote a greater demographic resemblance between older adults and the population living in the same census tract, and higher values indicate higher difference.

Results

Spatial distribution and the age effect

Results are stratified by age groups (65–74, 75–84 and 85+). The first question we sought to answer is whether the $NCID$ is randomly distributed throughout the city or whether certain sectors concentrate high and low values. As shown in [Figure 1](#), the $NCID$ is clustered within the territory. Census tracts with higher $NCID$ values tend to be surrounded by similar units. High values are found in all the neighborhoods in the historic center, especially the Raval, as

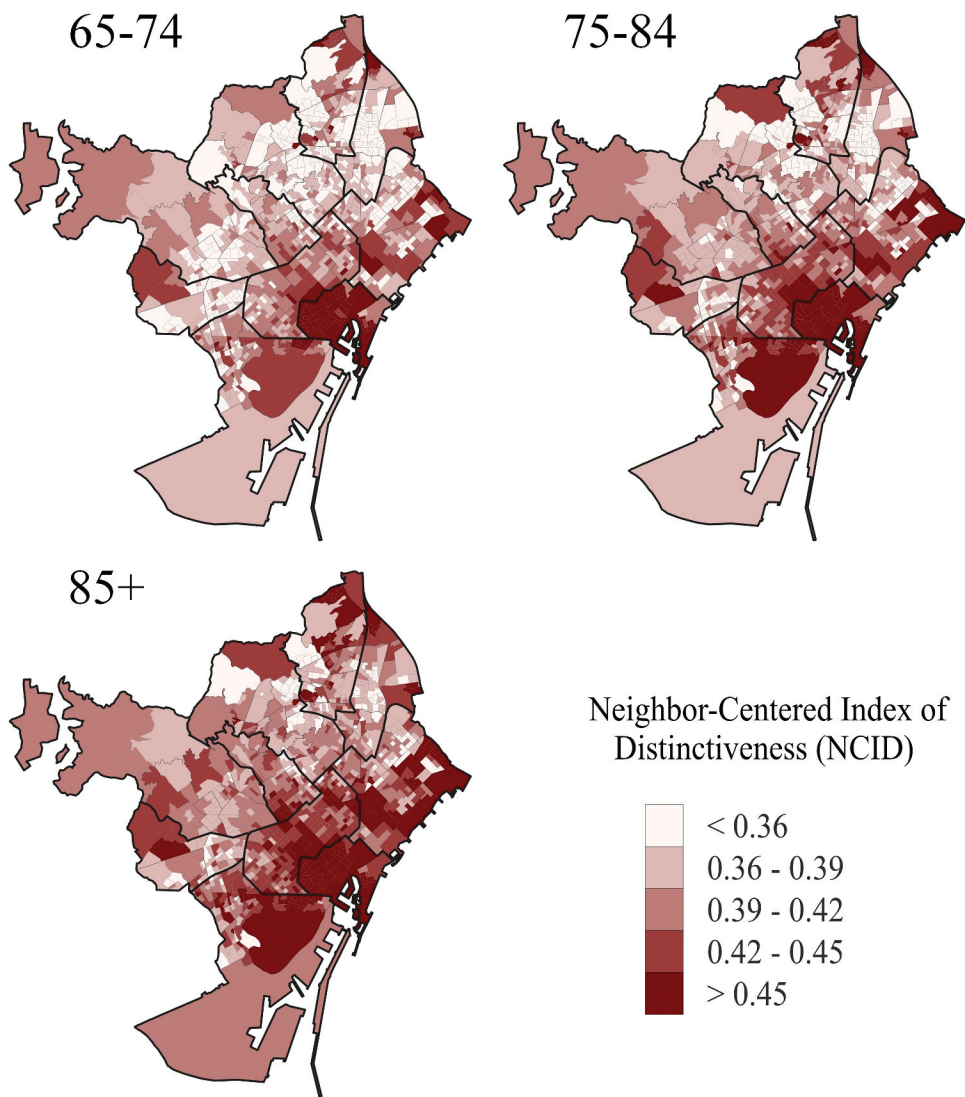


Figure 1. Neighbor–Centered Index of Distinctiveness (NCID) by age group, 2021.

well as other central areas such as the Poble-Sec neighborhood (Appendix 1). However, NCID values are also high in more peripheral neighborhoods, such as Ciutat Meridiana, Trinitat Vella, and el Besòs i el Maresme, located along the axis of the Besòs River. All these neighborhoods have experienced an influx of low-skilled foreign migrants of working age in recent years. In contrast, areas with more stable and aging populations, such as Font d'en Fargues, Horta, and Canyelles, have low NCID values. We found that census tracts with the highest demographic distinctiveness between older adults and their neighbors had an NCID of 0.45 or higher, as opposed to 0.35 or lower in areas with the lowest demographic distinctiveness.

As anticipated based on the index construction, our analysis also revealed that the NCID increases with age. In most neighborhoods, except for those located in the historic center and some along the Besòs River axis, the NCID for individuals up to the age of 75 is low. However, beyond this age group, NCID values rise sharply.

Temporal evolution

The second inquiry aims to examine the behavior of the NCID between 2011 and 2021 (Figure 2). The NCID generally increases in most areas, particularly in the 65–74 age group. Only 19.6% of the census tracts in the municipality have experienced a decrease in NCID levels in this group, while the number rises to 29.8% for the 75–84 age group, and to 44.0% for the group aged over 85. In general, the neighborhoods of Ciutat Vella and Eixample have experienced the greatest increase in the NCID. However, these results may be driven by two demographic effects. The first is the effect of the population structure itself, which is heterogeneous across the city. Neighborhoods that had more residents aged 55–64 in 2011 compared to those aged 65–74, for example, will have lower NCID in 2021 than their predecessors. The second is related to increased survival rates. Younger cohorts have crossed all ages with more favorable survival indicators, so the number of people reaching advanced ages should increase. This effect could significantly explain part of the variation in NCID at the oldest age between the two points in time.

Tracking the cohorts

To gain a better understanding of how NCID changes as individuals age, we follow different cohorts between 2011 and 2021. Figure 3 displays the change in NCID by birth cohort, net of the effects of the population age structure in the area. NCID increases in almost all census tracts and is particularly pronounced in some neighborhoods in the historic center (Barri Gòtic, Sant Pere, Santa Caterina i la Ribera, and Barceloneta), in Dreta de l'Eixample, along the axis of Passeig de Gràcia, in Sant Antoni, in Poblenou, and in Sagrada Família. This territorial pattern is almost identical in the two cohorts analyzed.

Discussion

This paper introduces a Neighbor-Centered Index of Distinctiveness (NCID) based on the principles of propinquity and homophily, which are well-established factors in the formation of social ties (Fuhse & Gondal, 2024; McPherson et al., 2001; Verbrugge, 1977). We estimate NCID for older adults living in census tracts in Barcelona as a measure to identify living areas where older adults are more distinct to their neighbors and may feel less connected to them. The identification of such areas has the potential to promote social connectedness in old age through targeted interventions. We contribute to the ongoing debate about social connectedness by operationalizing urban and demographic changes that contribute to sociodemographic transformations of neighborhoods, and to the literature of neighborhood impacts on health by proposing an objective indicator (Weden et al., 2008).

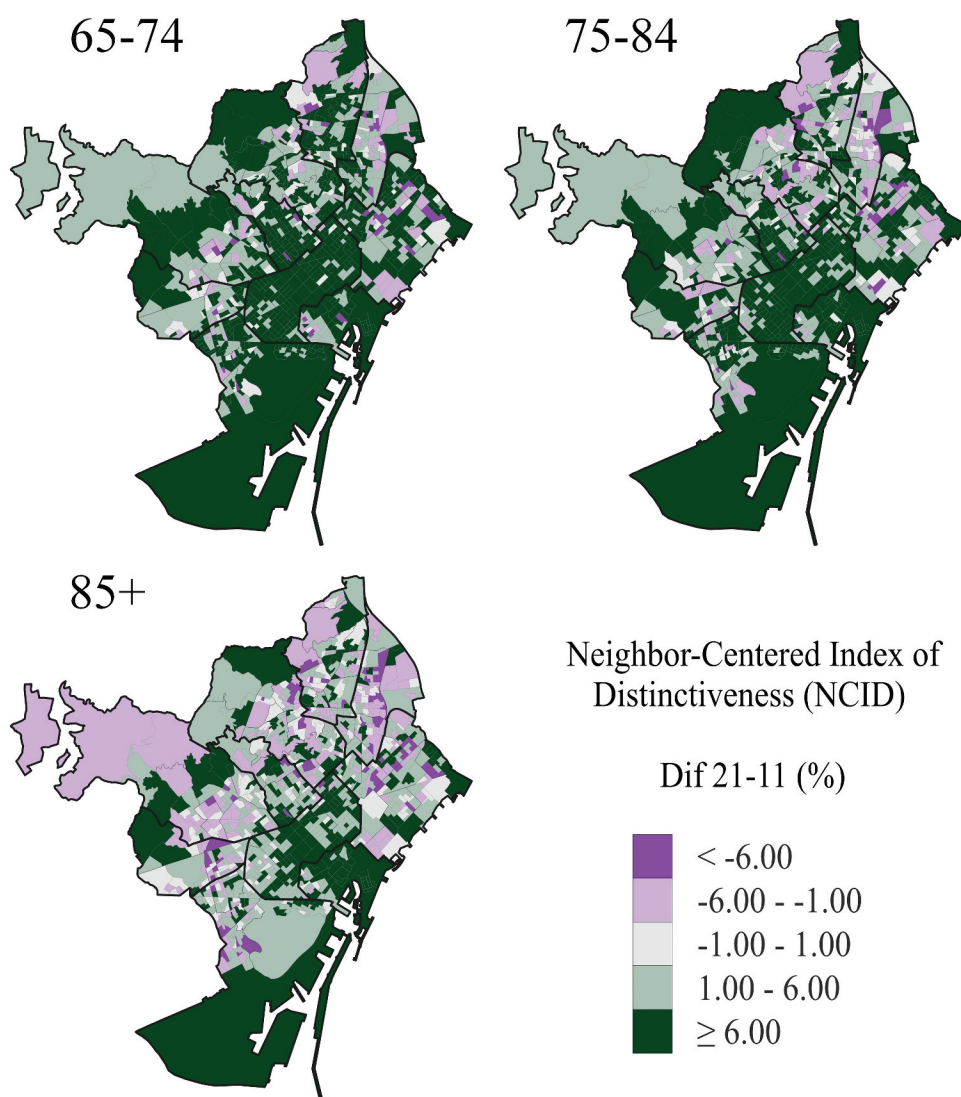


Figure 2. Neighbor-Centered Index of Distinctiveness (NCID) relative difference 2021–2011 (%) by age group, 2021.

Research in a variety of contexts has shown that the more likely people are, the more likely they will meet and become friends or acquaintances. There is abundant quantitative evidence on the importance of demographic resemblance in social ties (McPherson et al., 2001). Additionally, qualitative research has informed that older adults tend to feel a sense of connection with their neighbors when they share similar life experiences (Lewis & Buffel, 2020; May & Muir, 2015; Morgan et al., 2021; Yen et al., 2012). The NCID assesses the degree of distinctiveness between older adults and the general population living in specific areas. The method involves defining areas, measuring demographic distance based on a combination of variables, and calculating the NCID as the sum of the contributions from different groups. Lower values indicate greater distinctiveness between older adults and the overall population, while a higher NCID indicates increased difference. In this case study in Barcelona, we have used census tracts and measured distinctiveness based on sex, age, origin and length of residence.

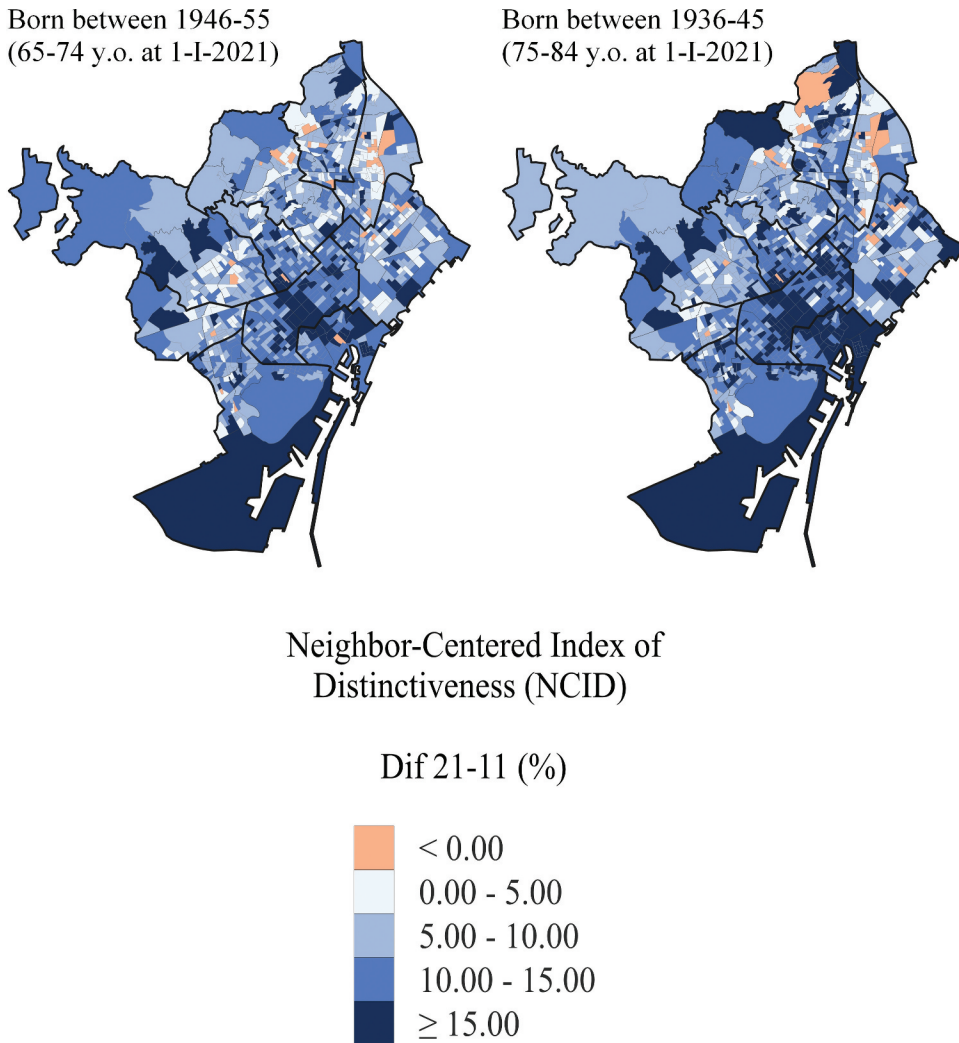


Figure 3. Neighbor-Centered Index of Distinctiveness (NCID) relative difference 2021–2011 (%) by cohort, 2021.

The analysis of the NCID has provided a picture of the heterogeneity and change over time in the interplay between aging and urban change. This interplay may contribute to a reduction in the social connectedness of older adults living in Barcelona. As the population ages, the likelihood of living surrounded by similar neighbors decreases due to mortality. Therefore, it is not surprising that the NCID increased among the oldest population. The study's most innovative findings concern the territorial patterns and their evolution in a city that has undergone major urban and sociodemographic changes in the last decade. After controlling for the effect of heterogeneous age structure, we found that the NCID has varied across the city between 2011 and 2021, although it has generally increased. Assuming that the role of differential mortality in this dynamic is negligible, we can conclude that the variation in NCID in the territory can be attributed to residential and migratory behavior. Further analysis of the variables that explain these territorial patterns is needed. Research suggests that neighborhoods with greater demographic stability have lower NCID compared to areas with high population turnover, particularly in areas undergoing strong processes of gentrification, including tourism and transnational gentrification, suggesting an increase in the risk of social disconnection (Burns et al., 2011; Cocola-Gant, 2018; López-Gay, Cocola-Gant, et al., 2021). These

processes have led to several changes, such as increased difficulty in accessing housing due to rising prices, a growing number of tourist apartments, a decrease in mobility and the quality of public spaces, and a weakening of associative networks and community support (Brollo & Celata, 2022; Meier & Frank, 2016).

Our findings have policy implications. In this study the NCID provides an objective measure of neighborhood that, based on the principles of propinquity and homophily, reflects older adults' opportunity to meet and interact with their neighbors (Fuhse & Gondal, 2024). It was used to identify living areas where older adults may be less socially connected with their neighbors. However, it is important to consider that objective neighborhood measures may be influenced by subjective perceptions of the neighborhood among residents (Weden et al., 2008). Studies have demonstrated that subjective sense of belonging and neighborhood identification are modifiable factors that enhance social connectedness (Cramm & Nieboer, 2015; Cruwys et al., 2022; Fong et al., 2021). Additionally, there is evidence supporting the positive impacts of weak and diverse ties (Bruggencate et al., 2018; Granovetter, 1983; Lam et al., 2023; Varjakoski et al., 2023), further reinforcing the potential of this tool for policymakers and practitioners.

This NCID shows the heterogeneity of situations in the city of Barcelona, indicating that it is not appropriate to treat the city as a single entity when designing effective interventions to support the well-being of older adults. Public policies to increase the social connectedness and sense of belonging and to prevent social isolation and loneliness among older adults should be considered at a local level rather than at the city level. It is important to note that older adults themselves are a diverse population. Additionally, the residential environments in which they live have specific dynamics that can influence their social connectedness, which affects their health and well-being (Holt-Lunstad, 2022). The NCID can help to understand the specificities of a city and assist in the allocation of resources for public policy based on sociodemographic realities. For instance, community centers should aim to create meeting places for older adults not only in a place where there are many older adults, but also in areas where they may be less likely to find meeting places with their neighbors, to create a social space that promotes and facilitates socialization with their neighbors and enhances social connectedness in the community.

Limitations and strengths

This study has some limitations. First, the data from the Municipal Population Register of Barcelona do not provide the date of arrival in the district or the postal address, but rather the date of first arrival in Barcelona, so we do not know if there have been any movements since then. Also, the length of stay in the neighborhood would provide a more accurate estimate at the level of small local areas. Second, our data have insufficient disaggregation of the origin of the residents of an area to be able to consider other dimensions related to the potential resemblance of neighbors, especially in the case of people born in Latin America, who may share a common language and thus facilitate social interaction. To construct the NCID we have considered the demographic profile of the population based on age, sex, country of origin and length of residence, but this indicator could also be constructed to account for other characteristics, as using socioeconomic measures of educational attainment, equivalized household income, class, ethnicity, gender or others that were unavailable in our data. Third, although the use of census tracts may not be representative of communities (Sampson, 1988), they are still appropriate for analyzing the living conditions of older adults, particularly the oldest old, whose daily lives tend to be concentrated in the home and nearby streets. Here we have used census tracts, but the index design allows it to be applied in alternative spatial contexts, such as "egohoods" (Laurence & Goebel, 2024) or activity spaces (Cagney et al., 2020), provided the necessary data are available, or to include neighboring units.

Despite these limitations, our index is an objective indicator derived from annually available secondary public data that combines information on "both individual-level and broader, structural-level forces" "to construct theoretically relevant macro-level measures across large numbers of communities" (Sampson,

1988, p. 778). This case offers valuable insights into how demographic dynamics shape the social environment and provides a framework for examining the association between local demographic dynamics and the changing position of older adults living in urban areas and their social connectedness or health-related outcomes (Weden et al., 2008). For example, future research could contrast the correlation of this index with survey measures of social connectedness, feeling of belonging or other indicators associated with the well-being of older adults (Bosch-Farré et al., 2020; Buffel et al., 2012; Burns et al., 2011; Cramm & Nieboer, 2015; Cramm et al., 2013; Cruwys et al., 2022; Fong et al., 2021; Gilleard et al., 2007; Lee & Raymo, 2021; Prattley et al., 2020; Sacker et al., 2017; Young et al., 2004). This could contribute to the development of early diagnostic tools that can inform policy decisions and stimulate research initiatives. This indicator could be a valuable tool for the field of environmental gerontology, as it can be adapted to other countries or contexts where demographic data is available at a low level of geography, such as population registers or periodically collected census data. In addition, this type of neighbor-centered demographic indicator can also contribute to health, social, and psychological studies of other populations where the interaction between individuals and their context may play a relevant role (Massey, 2005).

Conclusion

The social connectedness in later life and its impact on the health and well-being of individuals is a growing concern in aging urban populations. Researchers, practitioners, and policymakers may find this indicator a useful tool for identifying neighborhoods where older people may be less social connected with their local environment, and for guiding future research including qualitative studies, and interventions to promote greater social connectedness and health prevention. Identifying these living areas and monitoring the progression of this indicator can be an effective strategy to target studies and interventions. We recommend considering the heterogeneity of both specific vulnerable groups of older adults and their location in the city when developing support options to promote social connectedness.

Disclosure statement

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

Funding

This work was supported by the Barcelona City Council in collaboration with “laCaixa” Foundation within the framework of the Barcelona Science Plan 2020–2023 [21S09290-001] and was developed within the project ‘Social Isolation and Loneliness among the Urban Elderly: Analysis and Policy Recommendations for the City of Barcelona—GRANBCN’. This study was also supported by the Catalan Government under the CERCA program. IP and PZ acknowledge support from the European Research Council [ERC 2019-CoG-864616] and the Spanish Ministry of Science and Innovation R + D LONGHEALTH project (grant PID2021-128892OB-I00). PZ acknowledges support from the grant RYC2023-042942-I funded by MICIU/AEI /10.13039/501100011033 and FSE+.

About the authors

Pilar Zueras is a Ramón y Cajal Fellow at the Center for Demographic Studies (CED) in Barcelona, where she co-leads the Elderly Care research team. She earned her BA in sociology and her PhD in demography from the Autonomous University of Barcelona (UAB). From 2020 to 2022, she worked at the Institute for Social and Economic Research (ISER) at the University of Essex in the UK. Pilar is a social demographer interested in studying population aging and the challenges associated with it, such as care, as well as the well-being and health of middle-aged and older adults. Her work has been published in journals such as *Social Science and Medicine*, *the International Journal of Public Health*, and the *Population and Development Review*.

Iñaki Permanyer is an ICREA research professor working at the Center for Demographic Studies (CED). With a degree in Mathematics, he holds a PhD in Demography from the Autonomous University of Barcelona (UAB). Before coming to the CED, he has worked in the UAB Economics Department, in the Institute for Economic Analysis and in the Department of City and Regional Planning in Cornell University. He has been awarded with several research grants, like

the Fulbright Fellowship, the Juan de la Cierva and the Ramón y Cajal fellowships and a Starting Grant (2015–2020) from the European Research Council (ERC). Currently, he is the Head of the “Health and Ageing” Unit at the Center for Demographic Studies and is the PI of HEALIN, an ERC Consolidator Grant project (2020–2025). He has more than 50 publications in top field journals like *Population and Development Review*, *PNAS*, *Demography* or the *Journal of Development Economics*.

Antonio López-Gay is an associate professor at the Department of Geography of the Universitat Autònoma de Barcelona (UAB) and a researcher at the Center for Demographic Studies (CED-CERCA). He holds a PhD in Demography from UAB and a BA in Geography from the University of Barcelona. As an urban demographer, his research explores the interplay between population dynamics, urban transformation, and social and territorial inequalities. His recent work focuses on the sociodemographic impacts of gentrification, residential mobility and its role in reshaping urban socio-spatial structures, and the growing attraction of Southern European cities for highly mobile and temporary populations, including tourists, digital nomads, and skilled migrants. He has led and contributed to competitive research projects funded by national and international agencies and has published in journals such as *Urban Studies*, *Cities*, *Population*, *Space and Place*, and *Population and Development Review*.

Marc Ajenjo has received training in Educational Sciences (Autonomous University of Barcelona (UAB), 1986), Sociology (UAB, 1989) and Statistics (UAB, 1994). He completed a postgraduate course on Demographic Aspects of Demand Forecasting at the Center for Demographic Studies (CED, 1991) and a PhD in Human Geography, specializing in Demography (UAB, 2005). Since 1992, he has combined his research activity at the CED with teaching at the Department of Sociology of the UAB. His research interests are in the field of demography and include fertility, habitual mobility for work and, more recently, the use of time and the consequences of shared custody. He has collaborated on numerous R&D projects, and has directed the projects: “Time sharing and the use of space in dual-earner couples. Spain in the European context” and “Shared custody after a union breakdown: what contexts favor this emerging paradigm?”

Albert Esteve is a demographer and researcher, is the director of the Centre for Demographic Studies (CED) and a professor in the Department of Sociology at the Autonomous University of Barcelona (UAB). He has conducted research at the University of Minnesota, the National Institute of Demographic Studies in Paris, and Princeton University. Esteve has been a ‘Ramón y Cajal’ Fellow and has obtained research funding from the government’s National R&D Plan, the Generalitat of Catalonia, and the European Union’s various framework programs. He recently obtained an Advanced Grant, titled CORESIDENCE, funded by the European Research Council. He investigates demographic-related topics, marriage formation, marriage markets, and the structure of households, both nationally and internationally. He participates in research infrastructure projects related to the harmonization and dissemination of microdata censuses. His work has been published in journals such as the *Annual Review of Sociology*, *World Development*, *Population and Development Review*, and *Demography*.

ORCID

Pilar Zueras  <http://orcid.org/0000-0002-3345-8865>

References

- Anguelovski, I., Cole, H. V. S., O'Neill, E., Baró, F., Kotsila, P., Sekulova, F., Pérez Del Pulgar, C., Shokry, G., García-Lamarca, M., Argüelles, L., Connolly, J. J., Honey-Rosés, J., López-Gay, A., Fontán-Vela, M., Matheney, A., Oscilowicz, E., Binet, A., & Triguero-Mas, M. (2021). Gentrification pathways and their health impacts on historically marginalized residents in Europe and North America: Global qualitative evidence from 14 cities. *Health & Place*, 72, 102698. <https://doi.org/10.1016/j.healthplace.2021.102698>
- Bailey, N., Kearns, A., & Livingston, M. (2012). Place attachment in deprived neighbourhoods: The impacts of population turnover and social mix. *Housing Studies*, 27(2), 208–231. <https://doi.org/10.1080/02673037.2012.632620>
- Blokland, T., Vief, R., Krüger, D., & Schultze, H. (2023). Roots and routes in neighbourhoods. Length of residence, belonging and public familiarity in Berlin, Germany. *Urban Studies*, 60(10), 1949–1967. <https://doi.org/10.1177/00420980221136960>
- Bosch-Farré, C., Malagón-Aguilera, M. C., Ballester-Ferrando, D., Bertran-Noguer, C., Bonmatí-Tomás, A., Gelabert-Vilella, S., & Juvinyà-Canal, D. (2020). Healthy ageing in place: Enablers and barriers from the perspective of the Elderly. A qualitative study. *International Journal of Environmental Research and Public Health*, 17(18), 6451. <https://doi.org/10.3390/ijerph17186451>
- Brollo, B., & Celata, F. (2022). Temporary populations and sociospatial polarisation in the short-term city. *Urban Studies*, 60(10), 1815–1832. <https://doi.org/10.1177/00420980221136957>

- Bruggencate, T. T., Luijckx, K. G., & Sturm, J. (2018). Social needs of older people: A systematic literature review. *Ageing & Society*, 38(9), 1745–1770. <https://doi.org/10.1017/S0144686X17000150>
- Buffel, T., De Donder, L., Phillipson, C., De Witte, N., Dury, S., & Verté, D. (2014). Place attachment among older adults living in four communities in Flanders, Belgium. *Housing Studies*, 29(6), 800–822. <https://doi.org/10.1080/02673037.2014.898741>
- Buffel, T., Phillipson, C., & Scharf, T. (2012). Ageing in urban environments: Developing ‘age-friendly’ cities. *Critical Social Policy*, 32(4), 597–617. <https://doi.org/10.1177/0261018311430457>
- Buffel, T., Phillipson, C., & Scharf, T. (2013). Experiences of neighbourhood exclusion and inclusion among older people living in deprived inner-city areas in Belgium and England. *Ageing & Society*, 33(1), 89–109. <https://doi.org/10.1017/S0144686X12000542>
- Burns, V. F., Lavoie, J.-P., & Rose, D. (2011). Revisiting the role of neighbourhood change in social exclusion and inclusion of older people. *Journal of Aging Research*, 2012, e148287. <https://doi.org/10.1155/2012/148287>
- Cacioppo, J. T., & Cacioppo, S. (2014). Older adults reporting social isolation or loneliness show poorer cognitive function 4 years later. *Evidence-Based Nursing*, 17(2), 59–60. <https://doi.org/10.1136/eb-2013-101379>
- Cacioppo, J. T., Cacioppo, S., Capitanio, J. P., & Cole, S. W. (2015). The neuroendocrinology of social isolation. *Annual Review of Psychology*, 66(1), 733–767. <https://doi.org/10.1146/annurev-psych-010814-015240>
- Cagney, K. A., Cornwell, E. Y., Goldman, A. W., & Cai, L. (2020). Urban mobility and activity space. *Annual Review of Sociology*, 46(1), 623–648. <https://doi.org/10.1146/annurev-soc-121919-054848>
- Cocola-Gant, A. (2018). Tourism gentrification. *Handbook of Gentrification Studies*, 281–293.
- Cocola-Gant, A., & Gago, A. (2021). Airbnb, buy-to-let investment and tourism-driven displacement: A case study in Lisbon. *Environment and Planning A: Economy and Space*, 53(7), 1671–1688. <https://doi.org/10.1177/0308518X19869012>
- Cornwell, E. Y., & Waite, L. J. (2009). Social disconnectedness, perceived isolation, and health among older adults. *Journal of Health and Social Behavior*, 50(1), 31–48. <https://doi.org/10.1177/002214650905000103>
- Cotterell, N., Buffel, T., & Phillipson, C. (2018). Preventing social isolation in older people. *Maturitas*, 113, 80–84. <https://doi.org/10.1016/j.maturitas.2018.04.014>
- Cramm, J. M., & Nieboer, A. P. (2015). Social cohesion and belonging predict the well-being of community-dwelling older people. *BMC Geriatrics*, 15(1), 30. <https://doi.org/10.1186/s12877-015-0027-y>
- Cramm, J. M., van Dijk, H. M., & Nieboer, A. P. (2013). The importance of neighborhood social cohesion and social capital for the well being of older adults in the community. *The Gerontologist*, 53(1), 142–152. <https://doi.org/10.1093/geront/gns052>
- Cruwys, T., Fong, P., Evans, O., Batterham, P., & Cleave, A. L. (2022). Boosting neighbourhood identification to benefit wellbeing: Evidence from diverse community samples. *Journal of Environmental Psychology*, 81, 101816. <https://doi.org/10.1016/j.jenvp.2022.101816>
- Den Hoed, W., & Russo, A. P. (2024). Aging, everyday active mobility and the challenge of the tourist city: An illustration from Barcelona. *Urban Geography*, 46(5), 1–23. <https://doi.org/10.1080/02723638.2024.2436830>
- Domingo, A., & Bayona-I-Carrasco, J. (2024). Second Latin American migratory boom in Spain: From recovery to COVID-19. *Migration Studies*, 12(1), 93–113. <https://doi.org/10.1093/migration/mnad039>
- Donat, C. (2019). *Envelliment i habitatge a la metròpoli de Barcelona: dinàmiques, escenaris i reptes*, La Metròpoli en Transició. Bellaterra: Institut d'Estudis Regionals i Metropolitans de Barcelona.
- Finlay, J. M., & Kobayashi, L. C. (2018). Social isolation and loneliness in later life: A parallel convergent mixed-methods case study of older adults and their residential contexts in the minneapolis metropolitan area, USA. *Social Science & Medicine*, 208, 25–33. <https://doi.org/10.1016/j.socscimed.2018.05.010>
- Finney, N., & Jivraj, S. (2013). Ethnic group population change and neighbourhood belonging. *Urban Studies*, 50(16), 3323–3341. <https://doi.org/10.1177/0042098013482497>
- Fong, P., Cruwys, T., Robinson, S. L., Haslam, S. A., Haslam, C., Mance, P. L., & Fisher, C. L. (2021). Evidence that loneliness can be reduced by a whole-of-community intervention to increase neighbourhood identification. *Social Science & Medicine*, 277, 113909. <https://doi.org/10.1016/j.socscimed.2021.113909>
- Fuhse, J. A., & Gondal, N. (2024). Networks from culture: Mechanisms of tie-formation follow institutionalized rules in social fields. *Social Networks*, 77, 43–54. <https://doi.org/10.1016/j.socnet.2021.12.005>
- Galeano, J., & Bayona-I-Carrasco, J. (2018). Residential segregation and clustering dynamics of migrants in the metropolitan area of Barcelona: A demo-spatial analysis at the census tract level. *Quetelet Journal*, 6(1). <https://doi.org/10.14428/rqj2018.06.01.05>
- Gardner, P. J. (2011). Natural neighborhood networks-important social networks in the lives of older adults aging in place. *Journal of Aging Studies*, 25(3), 263–271. <https://doi.org/10.1016/j.jaging.2011.03.007>
- Gilleard, C., Hyde, M., & Higgs, P. (2007). The impact of age, place, aging in place, and attachment to place on the well-being of the over 50s in England. *Research on Aging*, 29(6), 590–605. <https://doi.org/10.1177/0164027507305730>
- Gotham, K. F. (2005). Tourism gentrification: The case of New Orleans' Vieux Carre (French Quarter). *Urban Studies*, 42(7), 1099–1121. <https://doi.org/10.1080/00420980500120881>
- Granovetter, M. (1983). The strength of weak ties: A network theory revisited. *Sociological Theory*, 1, 201. <https://doi.org/10.2307/202051>

- Hawkey, L. C., & Cacioppo, J. T. (2010). Loneliness matters: A theoretical and empirical review of consequences and mechanisms. *Annals of Behavioral Medicine*, 40(2), 218–227. <https://doi.org/10.1007/s12160-010-9210-8>
- Hayes, M., & Zaban, H. (2020). Transnational gentrification: The crossroads of transnational mobility and urban research. *Urban Studies*, 57(15), 3009–3024. <https://doi.org/10.1177/0042098020945247>
- Hochstenbach, C., & Musterd, S. (2018). Gentrification and the suburbanization of poverty: Changing urban geographies through boom and bust periods. *Urban Geography*, 39(1), 26–53. <https://doi.org/10.1080/02723638.2016.1276718>
- Holt-Lunstad, J. (2021). The major health implications of social connection. *Current Directions in Psychological Science*, 30(3), 251–259. <https://doi.org/10.1177/0963721421999630>
- Holt-Lunstad, J. (2022). Social connection as a public health issue: The evidence and a systemic framework for prioritizing the “social” in social determinants of health. *Annual Review of Public Health*, 43(1), 193–213. <https://doi.org/10.1146/annurev-publhealth-052020-110732>
- Holt-Lunstad, J., Smith, T. B., Baker, M., Harris, T., & Stephenson, D. (2015). Loneliness and social isolation as risk factors for mortality: A meta-analytic review. *Perspectives on Psychological Science: A Journal of the Association for Psychological Science*, 10(2), 227–237. <https://doi.org/10.1177/1745691614568352>
- Lager, D., Van Hoven, B., & Huigen, P. P. P. (2013). Dealing with change in old age: Negotiating working-class belonging in a neighbourhood in the process of urban renewal in the Netherlands. *Geoforum*, 50, 54–61. <https://doi.org/10.1016/j.geoforum.2013.07.012>
- Lam, J., Broccatelli, C., & Baxter, J. (2023). Diversity of strong and weak ties and loneliness in older adults. *Journal of Aging Studies*, 64, 101097. <https://doi.org/10.1016/j.jaging.2022.101097>
- Laurence, J., & Goebel, J. (2024). Immigration, segregation, and attitudes toward immigrants: A longitudinal multiscalar analysis across egohoods. *European Sociological Review*, jcae045. <https://doi.org/10.1093/esr/jcae045>
- Lee, S., & Raymo, J. M. (2021). Social exclusion and subjective well-being among older adults in Europe: Findings from the European social survey. *The Journals of Gerontology Series B*, 76(2), 425–434. <https://doi.org/10.1093/geronb/gbaa172>
- Lewis, C., & Buffel, T. (2020). Aging in place and the places of aging: A longitudinal study. *Journal of Aging Studies*, 54, 100870. <https://doi.org/10.1016/j.jaging.2020.100870>
- López-Gay, A., Andújar-Llosa, A., & Salvati, L. (2020). Residential mobility, gentrification and neighborhood change in Spanish cities: A post-crisis perspective. *Spatial Demography*, 8(3), 351–378. <https://doi.org/10.1007/s40980-020-00069-0>
- López-Gay, A., Cocola-Gant, A., & Russo, A. P. (2021). Urban tourism and population change: Gentrification in the age of mobilities. *Population, Space and Place*, 27(1), e2380. <https://doi.org/10.1002/psp.2380>
- López-Gay, A., Sales-Favà, J., Solana-Solana, M., Fernández, A., & Peralta, A. (2021). El avance de la gentrificación en Barcelona y Madrid, 2011-2019. Análisis socioespacial a partir de un índice de gentrificación. *Estudios Geográficos*, 82 (291), Article 291. <https://doi.org/10.3989/estgeogr.202195.095>
- López-Gay, A., Solana-Solana, M., Sales-Favà, J., Cole, H. V., & Ortiz-Guitart, A. (2023). Housing insecurity, lived reality, and the right to stay put in a gentrified southern European neighborhood: The case of Sant Antoni in Barcelona. In *A research agenda for gentrification* (pp. 151–172). Edward Elgar Publishing.
- Massey, D. B. (2005). *For space*. Sage.
- May, V., & Muir, S. (2015). Everyday belonging and ageing: Place and generational change. *Sociological Research Online*, 20(1), 72–82. <https://doi.org/10.5153/sro.3555>
- 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. <https://doi.org/10.1146/annurev.soc.27.1.415>
- Meier, L., & Frank, S. (2016). Dwelling in mobile times: Places, practices and contestations. *Cultural Studies*, 30(3), 362–375. <https://doi.org/10.1080/09502386.2015.1113630>
- Morgan, T., Wiles, J., Park, H.-J., Moeke-Maxwell, T., Dewes, O., Black, S., Williams, L., & Gott, M. (2021). Social connectedness: What matters to older people? *Ageing & Society*, 41(5), 1126–1144. <https://doi.org/10.1017/S0144686X1900165X>
- Phillipson, C., Bernard, M., Phillips, J., & Ogg, J. (2002). The family and community life of older people: Social networks and social support in three urban communities. *Social Policy Journal of New Zealand*, 19, 1–4. <https://www.msd.govt.nz/documents/about-msd-and-our-work/publications-resources/journals-and-magazines/social-policy-journal/spj19/19-pages195-198.pdf>
- Prattley, J., Buffel, T., Marshall, A., & Nazroo, J. (2020). Area effects on the level and development of social exclusion in later life. *Social Science & Medicine*, 246, 112722. <https://doi.org/10.1016/j.socscimed.2019.112722>
- Prieto-Flores, M.-E., Fernandez-Mayoralas, G., Forjaz, M. J., Rojo-Perez, F., & Martinez-Martin, P. (2011). Residential satisfaction, sense of belonging and loneliness among older adults living in the community and in care facilities. *Health & Place*, 17(6), 1183–1190. <https://doi.org/10.1016/j.healthplace.2011.08.012>
- Sacker, A., Ross, A., MacLeod, C. A., Netuveli, G., & Windle, G. (2017). Health and social exclusion in older age: Evidence from understanding society, the UK household longitudinal study. *Journal of Epidemiology and Community Health*, 71(7), 681–690. <https://doi.org/10.1136/jech-2016-208037>

- Sampson, R. J. (1988). Local friendship ties and community attachment in mass society: A multilevel systemic model. *American Sociological Review*, 53(5), 766–779. <https://doi.org/10.2307/2095822>
- Umberson, D., & Karas Montez, J. (2010). Social relationships and health: A flashpoint for health policy. *Journal of Health and Social Behavior*, 51(1_suppl), S54–S66. <https://doi.org/10.1177/0022146510383501>
- Varjakoski, H., Koponen, S., Kouvo, A., & Tiilikainen, E. (2023). Age diversity in neighborhoods-A mixed-methods approach examining older residents and community wellbeing. *International Journal of Environmental Research and Public Health*, 20(16), 6574. <https://doi.org/10.3390/ijerph20166574>
- Verbrugge, L. M. (1977). The structure of adult friendship choices*. *Social Forces*, 56(2), 576–597. <https://doi.org/10.2307/2577741>
- Voukelatou, V., Gabrielli, L., Miliou, I., Cresci, S., Sharma, R., Tesconi, M., & Pappalardo, L. (2021). Measuring objective and subjective well-being: Dimensions and data sources. *International Journal of Data Science and Analytics*, 11(4), 279–309. <https://doi.org/10.1007/s41060-020-00224-2>
- Weden, M. M., Carpiano, R. M., & Robert, S. A. (2008). Subjective and objective neighborhood characteristics and adult health. *Social Science and Medicine*, 66(6), 1256–1270. <https://doi.org/10.1016/j.socscimed.2007.11.041>
- Yen, I. H., Shim, J. K., Martinez, A. D., & Barker, J. C. (2012). Older people and social connectedness: How place and activities keep people engaged. *Journal of Aging Research*, 2012, 1–10. <https://doi.org/10.1155/2012/139523>
- Young, A. F., Russell, A., & Powers, J. R. (2004). The sense of belonging to a neighbourhood: Can it be measured and is it related to health and well being in older women? *Social Science & Medicine*, 59(12), 2627–2637. <https://doi.org/10.1016/j.socscimed.2004.05.001>