Does neighbourhood age mix matter? Examining neighbourhood age composition, social cohesion, and trajectories of wellbeing and cognitive function in later life

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Short Abstract

Research shows that where someone lives influences their health and wellbeing. However, little research has examined how the demographic composition of neighbourhoods, particularly the age structure or age mix, relates to health and wellbeing. In a context of population ageing, this study informs understandings and interventions for healthy ageing in place by drawing on longitudinal, geographically linked survey data to examine the relationship between residential age mix and health trajectories in later life. This study aims to understand how living in an age-diverse neighbourhood is associated with trajectories of wellbeing and cognition among people aged 50 years and over in England, and how perceived neighbourhood social cohesion moderates the relationship between age mix and health. Using novel geographically linked data from the English Longitudinal Study of Ageing, we fitted growth curve models to examine the association between an individual's baseline neighbourhood age mix and social cohesion with trajectories of wellbeing and cognitive function scores. Initial results show that people living in older, less diverse neighbourhoods have better wellbeing and cognitive function trajectories. However, our findings for cognitive function trajectories show that among those who report low social cohesion, people who lived in an older neighbourhood had significantly worse trajectories of cognitive function compared to people who lived in a younger or more diverse neighbourhood. This suggests that benefits of neighbourhood age mix for cognitive function in later life are particularly felt for older people who are marginalised in terms of sense of community and belonging.

Extended Abstract

Background

Substantial research shows that where someone lives influences their health and wellbeing. Much of the existing research on neighbourhood effects on health has focused on neighbourhood poverty and deprivation (Jivraj et al., 2020), urban rural differences (Allan et al., 2017; Riva et al., 2009; Singh & Siahpush, 2014), social cohesion (Rowley-Abel et al., 2025), or blue and green space (Pearce et al., 2016; Rowley-Abel et al., 2025). However, little research has examined how the demographic composition of neighbourhoods, particularly how neighbourhood age structure (or age mix), relates to health and wellbeing. This paper takes a longitudinal approach using geographically linked survey data to examine the relationship between residential age mix and health trajectories. This study aims to understand how living in an age-diverse neighbourhood in later life is associated with trajectories of wellbeing and cognition among people aged 50 years and over in England, using a nationally representative longitudinal study of ageing with linkage to census data and mid-year population estimates.

While little research has examined the links between neighbourhood age mix and health, a recent study by Varjakoski et al. (2023), which surveyed 420 older residents in Finland, found that older adults who live in age-diverse neighbourhoods report higher levels of neighbourhood social cohesion. Furthermore, intentional intergenerational practice has been found to improve social cohesion at the community and neighbourhood levels (Hatton-Yeo & Batty, 2011). Neighbourhood social cohesion, in turn, has been linked with higher wellbeing and slower cognitive ageing (Choi et al., 2023; Zhang et al., 2019), partly through pathways involving reduced psychological distress (Kang, 2024).

There is a wide body of evidence examining neighbourhood diversity and social cohesion or social capital, primarily in terms of racial, ethnic, or socioeconomic composition (Bécares et al., 2011; Visser & Tersteeg, 2019). This literature suggests that diverse neighbourhoods may facilitate daily encounters with people belonging to other ethnic or social groups, which can shape perceptions of other groups (Peterson, 2017; Visser & Tersteeg, 2019). In the context of age diversity, exposure to a diverse range of age groups could improve social cohesion, mitigate ageist beliefs, and reduce discrimination (de Souza & Grundy, 2007; Hatton-Yeo & Batty, 2011; Stokes & Moorman, 2016). For example, a US study found that higher concentrations of older adults aged 60 and older in US neighbourhoods had a protective effect against experiences of age discrimination among people aged 60-70 years (Stokes & Moorman, 2016). Furthermore, intergenerational interactions have been associated with improved psychosocial wellbeing (Cushing & van Vliet, 2016; Whear et al., 2023), cognitive function (Carlson et al., 2008), and physical health (La Park, 2014) among older adults.

However, merely having intergenerational mix in a neighbourhood, may not automatically lead to meaningful interactions between generations (Davet, 2022). In social networks research, there is evidence that people tend to interact with people who are similar to them, in terms of gender, age, religion, and ethnicity (Tulin et al., 2021). However, despite tending to have age-homogenous social networks, older people have long been shown to have a preference to socialise with people of a wide range of ages (Ward et al., 1985). In a study of people aged 50 and over living in Chicago, stable residence in a neighbourhood with a high proportion of people aged 65 and over was associated with improved cognitive function, but long-term exposure to these neighbourhoods was negatively associated with cognition (Clarke et al., 2012).

Existing scholarship thus points to connections between the age mix of neighbourhoods in which older people live and social cohesion, wellbeing and cognitive function both via direct and indirect mechanisms of socialisation and social support. Additionally, there is some suggestion that time spent in neighbourhoods of varying age diversity in the later lifecourse is significant for health outcomes. This paper extends this sparse scholarship, bringing contribution to understandings of healthy ageing in place. This intervention is timely given evidence for increasing age segregation over time in England and Wales (Sabater et al., 2017; Sabater & Finney, 2023), which raises concerns about demographic sustainability (Ingham et al., 2009) and reduced opportunities for intergenerational mixing.

We hypothesise that people who live in age-diverse neighbourhoods will have better trajectories of wellbeing and cognitive function through increased opportunities for

intergenerational mixing and social cohesion. Following this and drawing on notions of the 'buffering' effect of neighbourhood context (e.g. Becares et al 2011), we further hypothesise that the theorised negative effects of low levels of age mix can be ameliorated in contexts of high social cohesion. To examine these contentions this study will address the following research questions:

1. How is neighbourhood age mix associated with trajectories of wellbeing and cognitive function in later life?
2. How does the association between neighbourhood age mix and health vary by levels of perceived neighbourhood social cohesion? Does high social cohesion buffer any detrimental effects of place-based age homogeneity?

Methods

Data

We use 10 waves (20 years) of data from the English Longitudinal Study of Ageing (ELSA), a nationally representative survey of health and ageing for people aged 50 years and over. The first wave of data was collected in 2002-2003, with interviews occurring biennially. Geographically-linked data from ELSA were obtained via a secure data application and accessed through SecureLab, a secure virtual environment. We used the participant's residential location in their first wave of participation in the study, which was linked to 2001 Local Super Output Areas (LSOA) (NatCen Social Research, 2024). Decennial census data (2001, 2011, and 2021) and annual mid-year population estimates (2001-2023) from the Office for National Statistics were linked to 2001 LSOA codes using best fit lookup tables.

Our sample includes respondents aged 50 years and over with a valid baseline residential address in England, without missing information on neighbourhood social cohesion and contextual and individual covariates, and at least one wellbeing or cognitive function score. The final analytic sample included 12,528 individuals across 10 waves. As ELSA has ongoing sample refreshment, the baseline wave was defined as the first wave with a valid interview for each participant. Around 77% of the sample entered the study in wave 1 (2002/2003) and 10% entered the study in wave 4 (2008/2009).

Measures

Health outcomes. We examined longitudinal trajectories of two health outcomes: wellbeing and cognitive function. Wellbeing was measured using the CASP-19 score which is a 19-item measure of quality of life in older age in the domains of control, autonomy, pleasure, and self-realisation (Hyde et al., 2003). The minimum possible CASP-19 score is zero and the maximum possible score is 57, with higher scores indicating better wellbeing. Cognitive function was measured using a summary score of three validated measures of cognitive function: time orientation, immediate recall, and delayed recall (Banks et al., 2006). The minimum possible cognitive function score is zero and the maximum possible score is 24, with higher scores indicating better cognitive function.

Neighbourhood age mix. The primary contextual variable, baseline neighbourhood age mix, was based on Simpson's Reciprocal Diversity Index (RDI) calculated across 5-year age

groups (full details of the approach are available in Wilkie et al, under review), and the percent aged 65 years and over, resulting in four groups. *Very age-diverse areas* were defined as neighbourhoods with an RDI in the top 70th percentile and higher; *moderately age diverse areas* were defined as neighbourhoods with an RDI between the 50th and 69th percentiles; *older, less age diverse* areas were defined as neighbourhoods with an RDI below the median and at least 20% of the population aged 65 years and over; *younger, less age diverse* areas were defined as neighbourhoods with an RDI below the median, and less than 20% of the population aged 65 years and over. Neighbourhood age mix measures were calculated annually using mid-year population estimates and matched to respondents' interview years.

Perceived neighbourhood social cohesion. To estimate perceived neighbourhood social cohesion, we used a subjective neighbourhood satisfaction score which is a summary of nine variables collected in Waves 1, 3, and 7 (Sait & Jivraj, 2022). The questions assessed sense of belonging to an area, perceptions of safety, vandalism, cleanliness, and loneliness, and the trustworthiness, friendliness, and helpfulness of people living in their neighbourhood. The responses were coded on a Likert scale between 1 and 7, where higher scores represent higher social cohesion. We used the first valid neighbourhood satisfaction score to approximate baseline neighbourhood social cohesion. The minimum possible social cohesion score is 9 and the maximum possible score is 63, with higher scores indicating higher social cohesion.

Time. Time was measured using age in years at each wave, ranging from 50 to 90 years. The age variable is top coded at 90 to avoid potential disclosure.

Covariates. We included several baseline individual covariates in our descriptive analysis and models, including gender (man or woman), educational attainment (below high school, high school graduate, college and above), housing tenure (own or rent) and the number of years a participant had lived in their home at baseline. Baseline contextual covariates included urban-rural status (urban or rural) and quintiles of relative deprivation, based on the Townsend index of deprivation, which is constructed using four census variables: unemployment, home ownership, car ownership, and household overcrowding. The Townsend index scores were quintiled across all LSOAs in each census year. Quintile 1 indicates LSOAs with the lowest deprivation levels and Quintile 5 indicates LSOAs with the highest deprivation levels. The Townsend index from the most recent census year was used as baseline Townsend Index for each participant.

Analytic strategy

To examine the relationship between neighbourhood age mix and trajectories of wellbeing and cognitive function, we fitted multilevel linear growth curve models with random effects for age. Repeated observations from waves 1-10 (level 1) were clustered within individuals (level 2). To account for nesting of individuals within baseline LSOAs, we adjusted the standard errors for clustering at the LSOA level. Models were adjusted for baseline covariates including gender, housing tenure, number of years lived in their home, and contextual covariates including deprivation quintile and urban-rural status. We included linear and quadratic terms for age to capture curved trajectories of health outcomes over time. We also

fitted models with an interaction between neighbourhood age mix at baseline and neighbourhood social cohesion.

We used survey weights to account for differences in response patterns in each wave. Analysis was performed using Stata 18.

Results

Table 1 shows baseline individual and contextual characteristics by neighbourhood age mix. Respondents who lived in an older, less-diverse area had higher rates of college education and owning their own home, and had lived in their homes for fewer years, compared to people living in a younger, less-diverse area or mixed area. They also had higher average social cohesion, wellbeing, and cognitive function scores and were more likely to live in affluent and rural neighbourhoods. There was a similar age and gender distribution across area types.

Table 1. Baseline individual and contextual characteristics by baseline neighbourhood age mix. Statistics reported are means (SD) for continuous variables and percentages for categorical variables.

	Older, less-diverse	Younger, less diverse	Moderately age-diverse	Very age diverse	All
Individual characteristics	Mean (SD) or percent				
Age (years)	61.7 (0.4)	60.4 (0.2)	61.8 (0.2)	62.9 (0.2)	61.7 (0.1)
Years living in current home	16.9 (0.5)	19.5 (0.2)	19.9 (0.3)	19.9 (0.2)	19.6 (0.1)
Educational attainment					
Less than high school	29.7	41.1	42.5	47.1	43.0
High school/some college	48.2	42.2	43.0	39.9	41.9
College and above	22.1	16.7	14.4	13.0	15.1
Gender					
Man	49.1	47.9	47.6	46.3	47.3
Woman	50.9	52.1	52.4	53.7	52.7
Housing tenure					
Own	89.7	80.5	82.9	80.7	81.6
Rent (or rent-free)	10.3	19.5	17.1	19.3	18.4
Neighbourhood social cohesion	50.6 (0.4)	45.7 (0.2)	48.2 (0.2)	47.4 (0.1)	47.2 (0.1)
Wellbeing (CASP-19)	42.5 (0.4)	41.5 (0.2)	41.8 (0.2)	41.4 (0.2)	41.6 (0.1)
Cognitive function	14.4 (0.2)	14.1 (0.1)	13.9 (0.1)	13.7 (0.1)	13.9 (0.04)
Contextual characteristics	Mean (SD) or percent				
Deprivation quintile[1]	1.7 (0.04)	2.9 (0.03)	2.4 (0.02)	2.8 (0.02)	2.7 (0.01)
Urban-rural neighbourhood					
Urban	46.6	84.4	71.2	79.0	77.1
Rural	53.4	15.6	28.8	21.0	22.9
N	670	4,375	2,930	4,553	12,528

[1] 1 = least deprived, 5 = most deprived

Multilevel models adjusted for gender found that people who live in an older, less-diverse area had better trajectories of wellbeing ($p<0.001$) and cognitive function ($p=0.001$) compared to people who live in a younger area or very age-diverse area, however the association between age mix and health was not significant after adjusting for covariates including years lived in home, housing tenure, neighbourhood deprivation, and urban-rural status.

We also fitted multilevel models for wellbeing and cognitive function with an interaction between neighbourhood social cohesion and age mix at baseline, adjusting for covariates including gender, housing tenure, deprivation quintile, urban-rural status, and number of

years lived in their home. We found that people who reported low neighbourhood social cohesion have worse trajectories of wellbeing compared with people who reported high neighbourhood social cohesion, but the relationship between baseline neighbourhood age mix with wellbeing did not vary by level of social cohesion. Figure 1 shows predicted trajectories of CASP-19 score with 95% confidence intervals by baseline age mix and levels of social cohesion (at the 1st, 50th, and 99th percentiles). Models were adjusted for baseline covariates including gender, housing tenure, number of years lived in home, deprivation quintile, and urban-rural status.

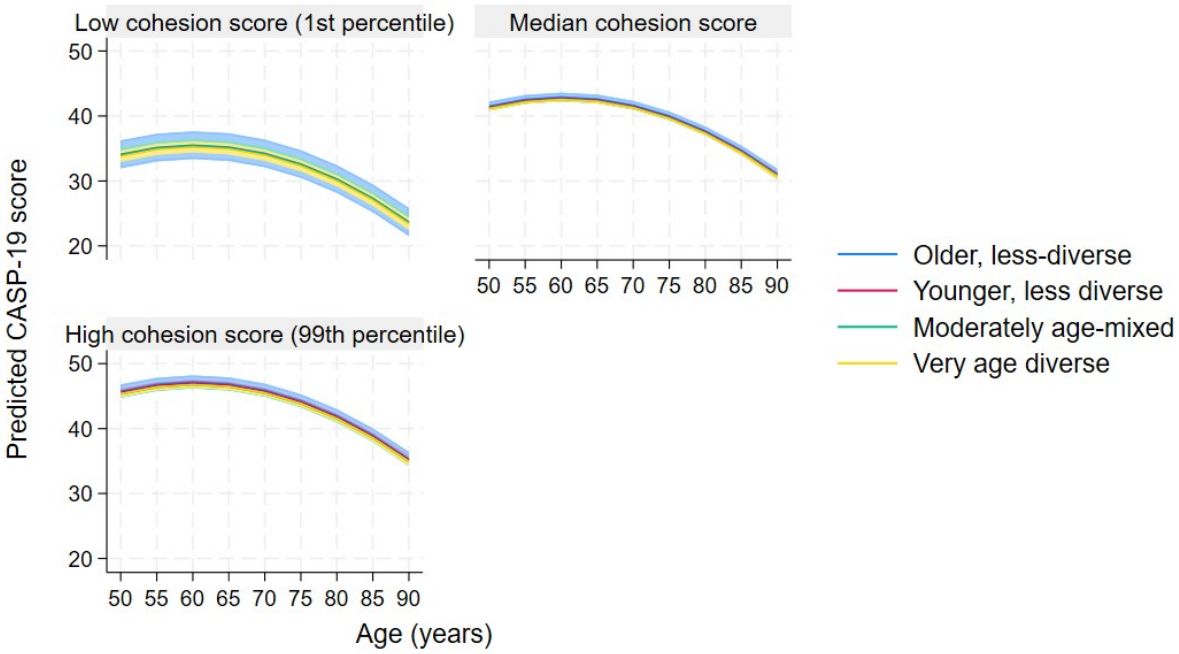

Figure 1. Predicted trajectories of CASP-19 score with 95% confidence intervals by baseline neighbourhood age mix and neighbourhood social cohesion, adjusted for gender, housing tenure, years in home, deprivation quintile, and urban-rural status.

Note: the younger, less-diverse line is not visible in some panels because it is overlapped by the moderately age-mixed line. The figure will be updated prior to conference.

For models predicting trajectories of cognitive function, we found that people who reported low neighbourhood social cohesion had adverse trajectories of cognitive function compared to those who reported high social cohesion. However, among those reporting low social cohesion, people who lived in an older, less diverse area, experienced significantly worse trajectories of cognitive function compared to people who lived in younger, less diverse or age-mixed areas. In contrast, among those reporting high social cohesion, people who Iived in an older, less-diverse area experienced better trajectories of cognitive function compared to people who lived in younger, less diverse, or very age-mixed areas (p=0.01). Figure 2 shows predicted trajectories of cognitive function score with 95% confidence intervals by baseline neighbourhood age mix and levels of neighbourhood social cohesion (at the 1st, 50th, and 99th

percentiles). Models were adjusted for baseline covariates including gender, housing tenure, number of years lived in home, deprivation quintile, and urban-rural status.

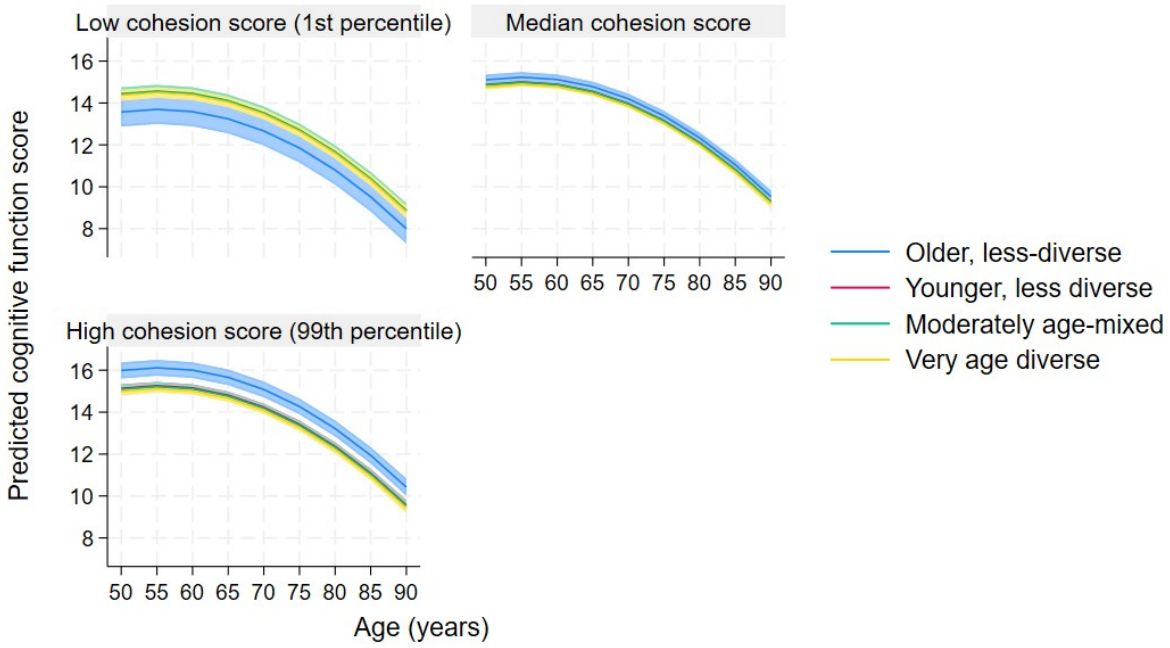

Figure 2. Predicted trajectories of cognitive function with 95% confidence intervals by baseline neighbourhood age mix and social cohesion, adjusted for gender, housing tenure, years in home, deprivation quintile, and urban-rural status.

Note: the younger, less-diverse line is not visible as it is overlapped by the moderately age-mixed line. The figure will be updated prior to conference.

Conclusion

Our initial findings indicate that people in older, less diverse neighbourhoods have better wellbeing trajectories in later life. However, this association can largely be explained by individual and contextual factors and does not vary according to perceived neighbourhood social cohesion. Our descriptive analysis found that people living in older, less-diverse areas report higher neighbourhood social cohesion scores compared to people living in younger, less-diverse areas and very age-diverse areas, suggesting that our initial findings of better health trajectories in older areas could reflect the higher average levels of social cohesion in these areas. Overall, our analyses suggest that neighbourhood age composition alone is not a strong determinant of wellbeing among people aged 50 and over.

However, we find an association between age mix, neighbourhood social cohesion, and cognitive function trajectories, after adjusting for individual and contextual covariates. The association of neighbourhood age composition on cognitive function appears to depend on perceived levels of neighbourhood social cohesion. Among people who report low social cohesion, residing in an age mixed neighbourhood is associated with more favourable

cognitive function trajectories, potentially reflecting protective effects on cognition from intergenerational contact and experiences of age diversity. Conversely, people living in predominantly older neighbourhoods may experience cognitive benefits when social cohesion is high, possibly due to a strong sense of belonging and social ties. However, people living in older neighbourhoods may be at risk of poorer cognitive outcomes when they experience low social cohesion, or feel marginalised, which could be related to limited intergenerational interactions and pronounced social isolation. While prior research has linked higher neighbourhood social cohesion to better cognitive function (e.g., Zaheed et al., 2019), this study is the first to find evidence that social cohesion may moderate the relationship between neighbourhood age mix and later-life cognitive trajectories. These findings contribute to emerging debates on healthy ageing and ageing in place and highlight the importance of considering both contextual factors, such as the demographic composition of neighbourhoods, and resident's subjective experiences. However, further analysis is required to explore this finding and rule out alternative explanations. Ongoing analyses will be completed in SecureLab over the next two months and will add to our current findings by examining whether the relationship between age mix and health differs across birth cohorts, change in neighbourhood social cohesion and neighbourhood age mix over time, selection processes into older, mixed, or younger areas, and whether social capital (i.e., relationships with family and friends) or social participation (i.e., participation in neighbourhood, religious, or charitable organisations) can explain some of the differences in cognitive function between older, younger, and diverse neighbourhoods. The final paper will examine the dynamics of the relationship between neighbourhood age mix, neighbourhood social cohesion, and cognitive function trajectories.

Authors' note

Data was accessed from the UK data service via SecureLab, a secure data environment. All in-text results, tables, and figures included in this extended abstract were approved for release by the UK Data service and are preliminary versions which will be finalised prior to the final draft and presentation.

Data citation

NatCen Social Research. (2024). *English Longitudinal Study of Ageing: Waves 1-10, 2002-2023: Census 2001 Lower Layer Super Output Areas: Secure Access* [Data collection]. 3rd Edition. UK Data Service. SN: 8425. https://doi.org/10.5255/UKDA-SN-8425-2

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