Cultural engagement and physiological ageing: a fixed-effects analysis

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ABSTRACT

Background Cultural engagement reportedly enhances older adults' well-being. Physiological age (PA) reflects the deterioration of physical and physiological systems, and a greater PA increases the risks of various health conditions and mortality. This study aimed to investigate the association between cultural engagement and physiological ageing in UK older adults, accounting for time-invariant unmeasured confounders.

Methods The data were derived from the English Longitudinal Study of Ageing. Older adults who participated in at least two of waves 2, 4 or 6 were analysed (n=1899 individuals, N=4207 observations; 46.9% were male). Cultural engagement scores were calculated based on the frequency of going to cinemas, museums and theatres, ranging from 0 (lowest engagement) to 15 (highest engagement). PA was derived from 10 physiological markers and clinical indicators, including blood pressure, forced expiratory volume, grip strength and body mass index, using the Klemera-Doubal method. A fixed-effects linear regression model was fitted to estimate the association between the cultural engagement score and PA. Time-varying confounders, including socioeconomic and health status, were adjusted for.

Results The participants exhibited a cultural engagement score with a mean of 4.3 (SD=3.2) and PA with a mean of 68.7 years (SD=7.8). The fixed-effects analysis showed that a 1-point higher cultural engagement score was significantly associated with a 0.085-year lower PA after adjusting for time-varying confounders (non-standardised coefficient (B) = −0.085; 95% CI −0.161 to −0.008).

Conclusions Enhancing cultural engagement may slow physiological ageing and promote healthy ageing.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Physiological age (PA) is a measure that reflects the deterioration of physiological function associated with ageing. Cultural engagement has been widely associated with improved health outcomes and enhanced well-being among older adults. However, the association with physiological ageing warrants further exploration.

WHAT THIS STUDY ADDS

⇒ We analysed data from participants in the English Longitudinal Study of Ageing (n=1899 individuals, N=4207 observations). A fixed-effects analysis found that a 1-point increase in cultural engagement was associated with a 0.085-year decrease in PA.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ This study is the first to find the longitudinal association between cultural engagement and PA. The findings contribute to promoting healthy ageing through enhancing cultural engagement.

INTRODUCTION

Although global life expectancy has increased, the extension of healthy life expectancy has progressed more slowly, resulting in longer periods of life spent with disease or suboptimal health.[1 2] The United Nations has declared the decade of healthy ageing through 2030, emphasising the preservation of functional capacity in older adults to enhance overall well-being.[3]

Ageing is a universal human process; however, individuals do not experience it uniformly. As a result, physiological age (PA) often diverges from chronological age (CA). PA is a measure that reflects the deterioration of physiological function associated with ageing.[4 5] A greater PA is associated with a higher risk of diseases and adverse health outcomes[6–9] and has been shown to be a more accurate predictor of mortality than CA.[10] Consequently, slowing the pace of physiological ageing can contribute to the promotion of healthy ageing.

Cultural engagement, such as going to cinemas, museums, or theatres, has been widely associated with improved health outcomes and enhanced well-being among older adults.[11 12] For example, studies conducted in European countries have found that participation in arts activities was associated with a reduced risk of mortality.[13 14] Similarly, longitudinal studies in Japan have demonstrated that older adults who engage in artistic and cultural activities exhibit a lower risk of developing depressive symptoms[15] and a decreased risk of cognitive impairment.[16]

A limited number of studies have examined the relationship between cultural engagement and physiological ageing or related markers. For example, stress-related biomarkers, such as salivary cortisol, have been shown to decrease following attendance at music concerts.[17] Culturally engaged adults have also shown lower levels of cardiovascular and inflammatory markers.[18] One study assessed arts and cultural engagement and reported an association with PA. Specifically, it incorporated participatory arts (eg, singing or dancing), receptive arts (eg, attending art exhibitions) and cultural engagements (eg, visiting heritage sites or museums) and

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found that greater frequency and diversity of engagement were associated with lower PA, as assessed using epigenetic clocks among adults in the UK.[19] Another study reported an association between cultural engagement and PA acceleration derived from clinical indicators using principal component analysis.[20] These studies addressed measured confounders, including demographic, socioeconomic, behavioural and health-related factors, using a doubly robust estimation method. However, unmeasured residual confounding, such as genetic factors[6 21] or personality traits,[22] may remain.

Fixed-effects analysis is a statistical approach that focuses on within-individual variation in exposure and outcomes, thereby cancelling out the bias due to unmeasured time-invariant confounding factors.[23 24] This method has been applied to explore the effects of cultural engagement on mental and social well-being in older adults, showing that increases in cultural engagement were associated with improvements in various well-being outcomes[25] and reductions in mental health conditions.[26] The present study aimed to investigate the association of cultural engagement with PA in older adults.

METHODS

Study participants

This study analysed data from older adults who participated in at least two of the following waves of the English Longitudinal Study of Ageing (ELSA): wave 2 (2004/2005), wave 4 (2006/2007) or wave 6 (2008/2009). ELSA is an ongoing population-based cohort study that follows a nationally representative sample of adults aged 50 or older living in England. The first wave was launched in 2002, with follow-up surveys conducted biennially. Further details of the ELSA study design are reported elsewhere.[27] For the present study, data from waves 2 to 6 of the harmonised ELSA dataset V.G.3 were used. Waves 2, 4 and 6 were selected for this study because they included nurse visits during which data on physiological markers and clinical indicators were collected, enabling the estimation of PA.

To conduct the fixed-effects analysis, each participant had to have data from at least two waves. As shown in online supplemental table 1, the final analytic sample included n=1899 individuals (46.9% male) and N=4207 observations with complete data on all relevant variables.

Cultural engagement

Cultural engagement was assessed using three items from a self-completion questionnaire, which measured the frequency of going to (a) the cinema, (b) a museum or an art gallery and (c) a theatre, a concert or the opera. This measure of cultural engagement has previously been shown to be associated with well-being and mortality of older adults.[14 25] For each item, respondents selected from six frequency categories: 'never', 'less than once a year', 'about once or twice a year', 'every few months', 'about once a month' and 'twice a month or more'. Following the approach of a previous study using a similar analytic framework,[25] these responses were scored on a scale from 0 (*never*) to 5 (*twice a month or more*). A composite cultural engagement score was calculated by summing the three items, yielding a total score ranging from 0 (lowest engagement) to 15 (highest engagement).

In addition, as a less sensitive but more interpretable exposure definition, the frequency of cultural engagement was also examined as an alternative exposure. Specifically, the highest frequency of engagement across the three items was dichotomised into 'twice a year or less' and 'every few months or more', following a previous study.[28]

Physiological age

PA was estimated based on multiple physiological markers and clinical indicators using the Klemera-Doubal method (KDM).[4] Among various algorithms for estimating PA, the KDM has been most used.[29] It also demonstrated better predictive ability for mortality, as indicated by a greater area under the curve, compared with other commonly used algorithms such as principal component analysis or multiple linear regression.[10]

Any measurements that systematically change with CA can potentially contribute to the estimation of PA.[30] This study modified the variable selection procedure described in a previous study.[31] Physiological markers and clinical indicators were selected based on their representativeness of different physiological systems, their correlation with CA and independence within the same physiological systems. More specifically, the indicators representing the cardiovascular system, respiratory system, haematologic system, metabolic system and musculoskeletal system were selected. Of the indicators, those correlated with CA assessed in the same wave (|Pearson's correlation coefficient, rho|>0.1) were retained. Then, pairwise correlations among the physiological markers and clinical indicators within the same physiological systems were examined. When |rho| was greater than 0.8, the indicator with the strongest correlation with CA was retained. When pairwise correlations |rho| were less than 0.8, both indicators were retained. As a result, 10 physiological markers and clinical indicators were finally incorporated into KDM algorithm, which was applied separately for each cross-sectional wave (n=2769, 3094, and 4431 for waves 2, 4 and 6, respectively) and stratified by sex: pulse pressure, diastolic blood pressure (cardiovascular system), forced expiratory volume (respiratory system), haemoglobin concentration, fibrinogen (haematologic system), glycated haemoglobin, low-density lipoprotein cholesterol (metabolic system), body mass index, grip strength and walking speed (musculoskeletal system). Further details of the variable selection procedure are reported elsewhere.[32]

Covariates

In line with a previous study investigating the association between cultural engagement score and well-being using fixed-effects analysis,[25] the following time-varying confounders were controlled: CA (years), household income (quartile categories), household wealth (quartile categories), home ownership (yes or no), in paid employment (yes or no), partnership status (partnered (married/partnered) or unpartnered (separated/divorced/widowed/never married)), self-rated health (good (excellent/very good/good) or poor (fair/poor)), chronic health conditions (yes or no) and ever smoked (yes or no). In addition, having any limitation in instrumental activity of daily living (IADL) (yes or no) and frequency of physical activity (less than once a week, once a week or more) were adjusted, considering that the cultural engagement measurement in this study included the aspect of physically going out. Sex, educational attainment and ethnicity were used to characterise the study participants. These time-invariant variables were not included in the fixed effects but were included in the longitudinal model.

Statistical analysis

First, the association between the cultural engagement score and PA was estimated with fixed-effects linear regression models

Table 1 Demographic characteristics of the participants (N=4207 observations)

		Frequency of cultural engagement	
	Overall	Twice a year or less	Every few months or more
	N (%)	N (%)	N (%)
N	4207 (100.0)	2492 (59.2)	1715 (40.8)
Wave			
2	1125 (26.7)	677 (27.2)	448 (26.1)
4	1652 (39.3)	976 (39.2)	676 (39.4)
6	1430 (34.0)	839 (33.7)	591 (34.5)
Cultural engagement score*	4.3 (3.2)	2.3 (1.8)	7.3 (2.2)
Physiological age*	68.7 (7.8)	69.9 (8.1)	66.9 (6.8)
Chronological age*	69.6 (6.5)	70.3 (6.8)	68.7 (5.9)
Household income			
1st quartile	860 (20.4)	621 (24.9)	239 (13.9)
2nd quartile	1186 (28.2)	807 (32.4)	379 (22.1)
3rd quartile	1190 (28.3)	680 (27.3)	510 (29.7)
4th quartile	971 (23.1)	384 (15.4)	587 (34.2)
Household wealth			
1st quartile	570 (13.5)	435 (17.5)	135 (7.9)
2nd quartile	947 (22.5)	660 (26.5)	287 (16.7)
3rd quartile	1265 (30.1)	711 (28.5)	554 (32.3)
4th quartile	1425 (33.9)	686 (27.5)	739 (43.1)
Home ownership			
No	1583 (37.6)	986 (39.6)	597 (34.8)
Yes	2624 (62.4)	1506 (60.4)	1118 (65.2)
In paid employment			
No	3369 (80.1)	2053 (82.4)	1316 (76.7)
Yes	838 (19.9)	439 (17.6)	399 (23.3)
Partnership status			
Unpartnered	1132 (26.9)	675 (27.1)	457 (26.6)
Partnered	3075 (73.1)	1817 (72.9)	1258 (73.4)
Self-rated health			
Good	3490 (83.0)	1950 (78.3)	1540 (89.8)
Poor	717 (17.0)	542 (21.7)	175 (10.2)
Chronic health conditions			
No	771 (18.3)	418 (16.8)	353 (20.6)
Yes	3436 (81.7)	2074 (83.2)	1362 (79.4)
Ever smoked			
No	1696 (40.3)	938 (37.6)	758 (44.2)
Yes	2511 (59.7)	1554 (62.4)	957 (55.8)
Limitation in IADL†			
No	3705 (88.1)	2112 (84.8)	1593 (92.9)
Yes	502 (11.9)	380 (15.2)	122 (7.1)
Physical activity‡			
Less than once a week	2902 (69.0)	1880 (75.4)	1022 (59.6)
Once a week or more	1305 (31.0)	612 (24.6)	693 (40.4)
Sex			
Men	1970 (46.8)	1214 (48.7)	756 (44.1)
Women	2237 (53.2)	1278 (51.3)	959 (55.9)
Educational attainment			
No qualification/NVQ 1/CSE	1295 (30.8)	1000 (40.1)	295 (17.2)
NVQ 2/GCE O level	817 (19.4)	464 (18.6)	353 (20.6)
NVQ 3/GCE A level	1022 (24.3)	557 (22.4)	465 (27.1)
NVQ 4/NVQ 5/degree	710 (16.9)	235 (9.4)	475 (27.7)
Other	363 (8.6)	236 (9.5)	127 (7.4)

Continued

Table 1 Continued

		Frequency of cultural engagement	
	Overall	Twice a year or less	Every few months or more
	N (%)	N (%)	N (%)
Ethnicity			
White	4172 (99.2)	Not reported§	Not reported§
Non-white	35 (0.8)	Not reported§	Not reported §

*Values represent mean (SD).
†Having limitation in the following activities: using phone, managing money, taking medications, shopping for groceries, preparing hot meals, using a map and doing housework.
‡Frequency of any vigorous, moderate or light physical activities.
§Not reported to reduce disclosure risk.
CSE, Certificate of Secondary Education; GCE A level, General Certificate of Education Advanced Level; GCE O level, General Certificate of Education Ordinary Level; IADL, instrumental activity of daily living; NVQ, National Vocational Qualification.

using Stata's 'xtreg' package. Formally, the following model was estimated:

$$\left(y_{iw} - \bar{y}_i + \bar{\bar{y}}\right) = \alpha + \left(x_{iw} - \bar{x}_i + \bar{\bar{x}}\right)\beta_0 + \left(l_{kiw} - \bar{l}_{ki} + \bar{l}_k\right)\beta_k + \left(e_{iw} - \bar{e}_i + \bar{v}\right) + \bar{\bar{e}}$$

where y_{iw} and x_{iw} denote PA and cultural engagement score, respectively, for individual i at wave w. The vector l_k represents k time-varying confounders, including CA, household income, household wealth, home ownership, in paid employment, self-rated health, marital status, chronic health conditions, ever smoked, IADL and physical activity. These confounders were simultaneously included in one model. $\bar{y}_i$ and $\bar{x}_i$ are the average of PA and cultural engagement scores within the individual i, respectively, and $\bar{\bar{y}}$ and $\bar{\bar{x}}$ are the average of all data points. e_{iw} is an error term for individual i at wave w, and $\bar{v}$ is the average of the individual-specific error term. Coefficient β_0 is the parameter of interest, representing the association between cultural engagement score and PA, independent of measured time-varying confounders and unmeasured time-invariant confounders. In addition to the model using the cultural engagement score, a model with dichotomised cultural engagement frequency as an alternative exposure was also estimated. The analysis included 4207 observations from 1899 individuals with complete data on all relevant variables (online supplemental table 1).

Second, the association between cultural engagement and PA two waves later (ie, 4 years) was examined. Formally, the following model was estimated:

$$y_{w+2} = \alpha + x_w\beta_1 + l_{kw}\gamma_k + c_m\delta_m + e$$

where w represents survey wave (w=2, 4). Here, y denotes PA, x is the cultural engagement score and l_k represents time-varying confounding factors, namely, PA, CA, household income, household wealth, home ownership, in paid employment, self-rated health, marital status, chronic health conditions, ever smoked, IADL and physical activity. c_m represents time-invariant confounding factors, namely, ethnicity, sex and educational attainment. e is the error term. The covariates were simultaneously included in one model. Clustered standard errors within individuals were estimated, as individuals who participated in all of waves 2, 4 and 6 provided two sets of two time-point observations. In this model, β_1 is the parameter of interest, capturing the association between cultural engagement score and PA after two waves (ie, 4 years). Of the 1899 individuals, 247 who

Table 2 Between-person and within-person summary statistics of physiological age and cultural engagement score			
	N	**Mean**	**SD**
Physiological age			
Overall	4207	68.7	7.8
Between person	1899		7.1
Within person			3.3
Cultural engagement score			
Overall	4207	4.3	3.2
Between person	1899		3.0
Within person			1.0

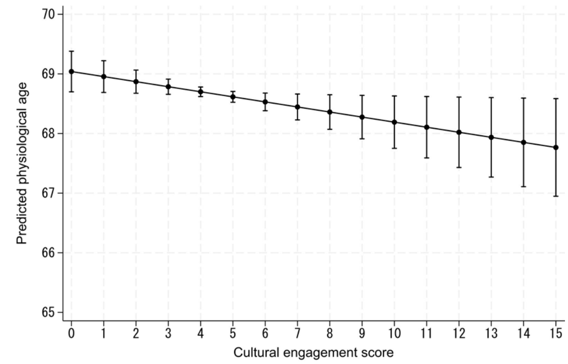

Figure 1 Physiological age predicted by cultural engagement score.

participated only in waves 2 and 6 were excluded because they did not contribute two time point observations with a 4-year interval. Accordingly, the 2061 observations from 1652 individuals with complete data on all relevant variables were included in the longitudinal analysis (online supplemental table 1). All analyses were conducted using Stata MP V.19.5.

RESULTS

Table 1 describes the demographic characteristics of the study participants by the frequency of cultural engagement. The mean PA was 66.9 years (SD = 6.8) among individuals with cultural engagement every few months or more and 69.9 years (SD=8.1) among those with lower cultural engagement. The corresponding mean CA were 68.7 (SD=5.9) and 70.3 (SD=6.8), respectively. Individuals with cultural engagement every few months or more were more likely to be women, have higher socioeconomic status, be in paid employment and have better health conditions. The distribution of cultural engagement scores is reported in online supplemental figure 1.

Table 2 reports between-person and within-person SD for PA and cultural engagement score. The between-person and within-person SD for PA were 7.1 and 3.3, respectively. Those for cultural engagement scores were 3.0 and 1.0, respectively.

Table 3 presents the results of the fixed-effects linear regression examining the association between cultural engagement and PA. A one-point higher cultural engagement score was significantly associated with a 0.085-year lower PA (non-standardised coefficient (B)=−0.085; 95% CI −0.161 to −0.008). Having cultural engagement every few months or more was associated with 0.278-year lower PA, albeit with a degree of uncertainty around the estimate (non-standardised coefficient (B)=−0.278; 95% CI −0.596 to 0.040). Figure 1 illustrates the predicted PA based on the model with cultural engagement scores. The predicted PA ranged from 69.0 (95% CI 68.7 to 69.4) for a cultural engagement score of 0 to 67.8 (95% CI 66.9 to 68.6) for a cultural engagement score of 15.

Table 4 presents the results of the longitudinal model with linear regression, reporting the association between cultural engagement and PA after 4 years. A one-point higher cultural engagement score was significantly associated with a 0.089-year lower PA (non-standardised coefficient (B)=−0.089; 95% CI −0.143 to −0.035). Having cultural engagement every few months or more was associated with 0.262-year lower PA, albeit with a degree of uncertainty around the estimate (non-standardised coefficient (B)=−0.242; 95% CI −0.544 to 0.060).

DISCUSSION

This study is the first to apply a fixed-effects analysis to examine the association between cultural engagement and PA. The findings indicate that higher levels of cultural engagement are significantly associated with lower PA. Similar results were obtained in the longitudinal analysis, which used cultural engagement measured 4 years prior to PA as an alternative exposure variable. By leveraging within-individual variation across multiple observations, the analysis controls unmeasured time-invariant confounding factors, thereby enhancing the robustness of the results.

Few studies have examined the association between cultural engagement and biological ageing. One cross-sectional study investigated the association between participatory or receptive cultural engagement and multiple epigenetic clocks constructed from DNA methylation. Their findings indicated that individuals

Table 3 Association between frequency of cultural engagement and physiological age; results from fixed-effects analysis		
	Coef. (95% CI)	**P value**
Exposure variable: cultural engagement score	−0.085 (−0.161 to −0.008)	0.030
Exposure variable: frequency of cultural engagement		
Twice a year or less	Reference	
Every few months or more	−0.278 (−0.596 to 0.040)	0.087

Cultural engagement score and frequency of cultural engagement were included in separate models.
Models were adjusted for chronological age, household income, household wealth, home ownership, instrumental activity of daily living, in paid employment, self-rated health, marital status, chronic health conditions, ever smoked and physical activity.
n=4207 observations of n=1899 individuals.
Coef., non-standardised coefficient; PA, physiological age.

Table 4 Association between frequency of cultural engagement and physiological age 4 years later; results from longitudinal analysis		
	Coef. (95% CI)	**P value**
Exposure variable: cultural engagement score	−0.089 (−0.143 to −0.035)	0.001
Exposure variable: frequency of cultural engagement		
Twice a year or less	Reference	
Every few months or more	−0.242 (−0.544 to 0.060)	0.116

Cultural engagement score and frequency of cultural engagement were included in separate models.
Models were adjusted for ethnicity, sex, educational attainment, physiological age, chronological age, household income, household wealth, home ownership, instrumental activity of daily living, in paid employment, self-rated health, marital status, chronic health conditions, ever smoked and physical activity.
N = 2061 observations of n = 1652 individuals.
Coef., non-standardised coefficient; PA, physiological age.

who engaged in cultural activities at least monthly exhibited 0.8 years slower physiological ageing.[19] Another study using ELSA reported the cross-sectional and longitudinal associations of cultural engagement with PA, derived using principal component analysis.[20] The magnitude of the association observed in the present study was modest compared with that reported in their study. This difference may partly be explained by the fact that our study leveraged within-person variation and different methods to derive PA. The results provide further evidence that greater cultural engagement is associated with lower PA, even after accounting for unmeasured time-invariant confounding factors.

Several mechanisms may explain how cultural engagement contributes to slower physiological ageing. First, cultural engagement can strengthen social relationships. A longitudinal study of adults in the UK found that frequent participation in cultural activities was associated with a reduced risk of loneliness 10 years later.[33] Second, cultural engagement may promote healthier lifestyle behaviours. For instance, a study conducted in low-income areas reported that individuals who engaged in cultural activities were more likely to maintain healthy diets and engage in physical activity.[34] Third, cultural engagement is linked to improvements in mental health and reduced psychological distress,[35] which is associated with slower physiological ageing.[36] These psychosocial and behavioural pathways may play a role in slowing the pace of physiological ageing. Meanwhile, it should be noted that the findings may also be explained by reverse causation, whereby better health and slower physiological ageing encouraged cultural engagement.

Cultural engagement is modifiable, and thus, it can serve as an effective intervention point for healthy longevity. Notably, the impact can be comparable to frequent physical activity.[19] Increasing geographical and financial accessibility to cultural infrastructure and events would expand opportunities for frequent participation. Community-based cultural activities may also foster greater community involvement. For example, a 10-week museum programme that included curator talks, object handling and discussion, and arts activities improved emotional outcomes such as cheerfulness and feelings of encouragement among socially isolated older adults.[37] Further intervention studies are needed to evaluate whether promoting cultural engagement leads to improvements in health outcomes and healthy ageing in the long term, whereby PA can be an appropriate measure of the outcome.

The strength of this study lies in its use of panel data and the application of fixed effects, which cancel out bias from unmeasured time-invariant confounders. Nonetheless, several limitations should be noted. First, the temporal relationship between cultural engagement and physiological ageing in this study remains unclear, as both were assessed at the same time. This raises the possibility of reverse causation. To address this limitation, a longitudinal analysis was conducted. The results showed that the cultural engagement score measured two waves prior to the PA assessment was significantly associated with lower PA, whereas the dichotomised cultural engagement score was not statistically significant. Second, the magnitude of the association was relatively small. This may partly reflect the fixed-effects approach, which relies on within-individual change during the follow-up period and therefore does not capture the impact of consistent cultural engagement over time. Future studies should consider the impact of persistent cultural engagement. To evaluate the impact of persistent cultural engagement on PA, the time-varying nature of cultural engagement and potential feedback between PA and cultural engagement should be considered. Third, cultural engagement was measured through self-report; however, this measure has been widely used in previous studies and has consistently shown associations with various health and well-being outcomes.[14 25 26] Fourth, results may vary depending on the indicators and algorithms used to estimate PA. However, the physiological markers and clinical indicators in the present study represented diverse physiological systems and were selected for their predictive ability for CA while minimising intercorrelations among the indicators, and the KDM has been reported as one of the most accurate algorithms for predicting mortality.[10 29] Fifth, the generalisability of the findings may be limited to adults in England. Although cultural engagement has been linked to favourable health outcomes in other cultural contexts, such as Japan,[15 16] further research is required to confirm the association between cultural engagement and physiological ageing across different cultural settings.

In conclusion, this study found that more frequent cultural engagement was associated with lower physiological age after accounting for measured time-varying and unmeasured time-invariant confounders. Promoting cultural engagement may therefore represent a promising strategy to slow the pace of physiological ageing and support healthy ageing in older adults.

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Competing interests None declared.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants. ELSA Wave 2 received ethical approval from the London Multi-Centre Research Ethics Committee on 12 August 2004 (MREC/04/2/006). ELSA Wave 4 received ethical approval from the National Hospital for Neurology and Neurosurgery and Institute of Neurology Joint Research Ethics Committee on 12 October 2007 (07/H0716/48). ELSA Wave 6 received ethical approval from the NRES Committee South Central–Berkshire on 28 November 2012 (11/SC/0374). All participants gave informed consent before taking part in the study. As the present study is a secondary analysis of anonymised data and the authors were unable to identify individual participants, the present study was exempted from ethics review by the Ethics Committee of the Institute of Science Tokyo. Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available in a public, open access repository. The data for the present study is available from the UK Data Archive (https://www.data-archive.ac.uk/).

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