Working paper

Retirement Effects on Cognitive Functioning: Exploring the Role of Gendered Employment Histories

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WP-26-003

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Date: 21 April 2026

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ZVR **524808900**

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Abstract

Cognitive functioning varies markedly among Europeans around retirement age. In light of this heterogeneity, studies on retirement effects on cognitive functioning produced inconsistent results. Drawing on the concept of cognitive reserve and gender differences in work careers and cognitive outcomes, this study addresses this ambiguity, analysing the role of gendered employment histories for retirement effects on cognition in Europe. This study uses panel data from the Survey of Health, Ageing and Retirement in Europe (SHARE; Waves 1-9; 2004-2022) to estimate the causal effect of retirement on episodic memory while accounting for heterogeneity by gender and employment histories (n=25,876; 13,823 men, 12,053 women). The study applies a novel two-step design: first, sequence analysis is used to construct gender-specific employment history clusters based on retrospective information on occupational complexity (more complex, less complex) and intensity (full-time, part-time) between ages 15 and 50. Second, fixed-effects two-stage least squares models are used to estimate causal retirement effects on episodic memory for men and women. Results unveil heterogeneous retirement effects. Among men, retirement reduces episodic memory for full-time lower complexity employment histories, while no significant effects are found for higher complexity full-time employment. Contrarily, male part-time trajectories exhibit positive retirement effects. Among women, retirement effects are positive only in the full-time, higher-complexity cluster. Retirement duration effects on episodic memory are negative for women across all clusters and for men with full-time careers. Overall, the findings highlight the importance of gender-specific context and past employment complexity for retirement effects, cautioning against uniform retirement schemes.

About the author

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Acknowledgements

This paper uses data from SHARE Waves 1, 2, 3, 4, 5, 6, 7, 8 and 9 (DOIs: 10.6103/SHARE.w1.900, 10.6103/SHARE.w2.900, 10.6103/SHARE.w3.900, 10.6103/SHARE.w4.900, 10.6103/SHARE.w5.900, 10.6103/SHARE.w6.900, 10.6103/SHARE.w7.900, 10.6103/SHARE.w8.900, 10.6103/SHARE.w9.900), see Börsch-Supan et al. (2013) for methodological details. Additionally, this paper uses data from the generated Job Episodes Panel (DOI: 10.6103/SHARE.jep.900), see Brugiavini et al. (2019) for methodological details. The Job Episodes Panel release 9.0.0 is based on SHARE Waves 3 and 7 (DOIs: 10.6103/SHARE.w3.900, 10.6103/SHARE.w7.900). The SHARE data collection has been funded by the European Commission, DG RTD through FP5 (QLK6-CT-2001-00360), FP6 (SHARE-I3: RII-CT-2006-062193, COMPARE: CIT5-CT-2005-028857, SHARELIFE: CIT4-CT-2006-028812), FP7 (SHARE-PREP: GA N◦211 909, SHARE-LEAP: GA N◦227 822, SHARE M4: GA N◦261 982, DASISH: GA N◦283 646) and Horizon 2020 (SHARE-DEV3: GA N◦676 536, SHARE-COHESION: GA N◦870 628, SERISS: GA N◦654 221, SSHOC: GA N◦823 782, SHARE-COVID19: GA N◦101 015 924) and by DG Employment, Social Affairs & Inclusion through VS 2015/0195, VS 2016/0135, VS 2018/0285, VS 2019/0332, VS 2020/0313, SHARE-EUCOV: GA N◦101 052 589 and EUCOVII: GA N◦101 102 412. Additional funding from the German Federal Ministry of Education and Research (01UW1301, 01UW1801, 01UW2202), the Max Planck Society for the Advancement of Science, the U.S. National Institute on Aging (U01_AG09740-13S2, P01_AG005842, P01_AG08291, P30_AG12815, R21_AG025169, Y1-AG-4553-01, IAG_BSR06-11, OGHA_04-064, BSR12-04, R01_AG052527-02, R01_AG056329-02, R01_AG063944, HHSN271201300071C, RAG052527A) and from various national funding sources is gratefully acknowledged (see www.share-eric.eu).

1 Introduction

The maintenance of good cognitive functioning is a requirement for living an independent life (Salthouse, 2012). Yet, around retirement age, trajectories of cognitive ageing differ substantially across individuals. To explain these heterogeneities and in light of the disruptive character of retirement, causal studies on the effect of retirement on cognitive functioning have reported inconsistent results (Alvarez-Bueno et al., 2021; White et al., 2025). At the same time, related studies have emphasized the role of gender (Herlitz et al., 2015; Weber et al., 2014) and gendered employment trajectories (Bertogg & Leist, 2023; Greenberg & Burgard, 2021; Tattarini et al., 2025) in shaping heterogeneity in later life cognitive resilience. Against this background, retirement effects may vary systematically across men and women and across distinct employment biographies.

This paper estimates whether and how employment history types condition the causal effect of retirement entry and time spent in retirement on episodic memory, separately for men and women. By explicitly linking retirement to gendered employment trajectories, the analysis advances a life course perspective on the retirement–health nexus, helping to reconcile heterogeneous findings in prior causal studies.

A potential causal relationship between retirement and cognitive functioning is commonly discussed through two complementary theoretical frameworks: the use it or lose it hypothesis and the cognitive reserve theory. The use it or lose it hypothesis argues that sustained engagement in cognitively stimulating activities in older age promotes positive neuroplasticity, helping to maintain good cognitive functioning (Salthouse, 2006). From this perspective, retirement may reduce cognitively demanding stimulation previously provided by employment, accelerating cognitive decline. However, retirement may also increase time available for alternative cognitively stimulating activities, implying that effects may depend on the extent to which post-retirement activities compensate for the loss of work-related stimulation.

The cognitive reserve theory, in contrast, highlights the cumulative role of lifelong experiences in shaping the adaptability of cognitive processes and resilience to age-related cognitive decline (Stern et al., 2020). Accordingly, long-term exposure to intellectual, physical, and social stimulation throughout the life course, such as through employment, may build reserve that buffers against adverse cognitive effects of retirement.

A vast body of research, often framed by the use it or lose it hypothesis, examines the causal effect of transitioning from the labour force to retirement due to reaching legal retirement ages. These studies typically emphasize the loss of occupational cognitive stimulation, while rarely considering cognitive stimulation accumulated across the life course (Alvarez-Bueno et al., 2021; White et al., 2025). In the European context, these studies provide mixed evidence, predominantly reporting no significant (Bianchini & Borella, 2016; Coe & Zamarro, 2011; Rose, 2020) or negative (Celidoni et al., 2017; Mazzonna & Peracchi, 2012) effects of retirement on cognitive functioning. Findings on the effect of retirement duration are similarly inconsistent, with studies documenting both positive (Bianchini & Borella, 2016) and negative effects (Celidoni et al., 2017; Mazzonna & Peracchi, 2017).

Only a few studies incorporate retrospective information to capture pre-retirement exposure to occupational stimulation. These studies typically classify individuals by the mental and physical demands of their most recent or longest-held occupation as a proxy for occupational cognitive stimulation (Coe et al., 2012; Kajitani et al., 2017; Mazzonna & Peracchi, 2017). For example, one study shows that greater complexity of one's longest-held job may mitigate adverse retirement effects on cognitive functioning among older Japanese men, consistent with a cognitive reserve interpretation (Kajitani et al., 2017). Contrasting evidence is found by a study that stratifies their sample of individuals living in the United States by whether their longest-held job was white- or blue-collar. The authors find significant positive retirement effects for blue-collar workers only, speculating that retirement may enable a shift toward more intellectually stimulating activities in this group, whereas such a shift may be less pronounced for white-collar workers (Coe et al., 2012). Correlational evidence aligns with the cognitive reserve theory, positively relating higher mental work demands in the last occupation pre-retirement to decelerated cognitive decline after retirement (Fisher et al., 2014; Romero Starke et al., 2019). Yet, no prior study has considered employment histories beyond the longest-held or most recent occupation, despite evidence hinting at the importance of cumulative employment trajectories for later life cognition (Bertogg & Leist, 2023; Greenberg & Burgard, 2021; Tattarini et al., 2025).

Moreover, despite well-documented evidence that participation in stimulating activities throughout the life course and after retirement follows gendered patterns (Antonucci et al., 2014; Bertogg & Leist, 2023; Schwartz & Litwin, 2018), most causal studies of retirement and cognition do not assess gender differences explicitly, or focus exclusively on men (White et al., 2025). The limited evidence that considers gender remains ambiguous and may primarily reflect differences in institutional and cultural contexts. For instance, evidence from Australia suggests larger negative retirement effects for men than for women (Atalay et al., 2019), whereas a study from China reports a positive effect for men and a negative effect for women (Lei & Liu, 2018). A study across 11 European countries reports negative effects of retirement duration for both genders, with educational attainment moderating the effect among women only (Mazzonna & Peracchi, 2012). These mixed patterns further underscore the need to account for gendered life course contexts when estimating retirement effects.

1.1 The Complex Nature of Retirement

A key reason for the occupational and gender-related heterogeneity in prior studies may be that retirement is embedded in gendered employment trajectories that jointly shape cognitive stimulation before and after retirement.

First, cognitive reserve may develop differently for men and women because lifetime employment patterns differ systematically by gender. Women are more likely to experience lower intensity employment, such as part-time employment, employment interruptions related to childbirth and childcare, and periods of combining paid work with caregiving responsibilities. Empirical evidence supports the relevance of such combined role biographies, indicating that trajectories integrating part-time employment and family roles may be beneficial for women’s later-life cognition. Employment breaks, on the other hand, were consistently connected to reduced later life cognitive functioning (Bertogg & Leist, 2023; Greenberg & Burgard, 2021; Ice et al., 2020).

Second, the nature of post-retirement activities that may substitute for employment-related stimulation also depends on gendered family roles and social relationship patterns. In this context, prior empirical literature points to structural gender differences in life course trajectories shaping the roles and activities older adults pursue after retirement. Pathways for this relationship include gender-specific patterns of labour force participation, caregiving roles, and the formation and maintenance of social relationships (Antonucci et al., 2014; Schwartz & Litwin, 2018). Research in the European context supports this notion showing that, unlike men, women’s involvement in employment throughout life is related to larger post-retirement social networks (Cohn-Schwartz & Naegele, 2024). Taken together, these mechanisms imply that estimating average retirement effects without accounting for gendered employment histories may obscure meaningful heterogeneity.

Despite the cumulative nature of cognitive health and the complexity of retirement which is shaped by structural factors throughout the life course, prior literature investigating its causal effects on cognitive functioning mainly focused on the removal of occupational cognitive stimulation alone (Alvarez-Bueno et al., 2021; White et al., 2025). These studies often account for socioeconomic variables or occupational complexity in the time around pensionable ages but hardly acknowledge the intertwined roles of gender and employment histories.

This paper addresses this gap in the literature by estimating the causal effect of retirement on cognitive functioning for gendered employment history clusters. In doing so, it proposes a combination of methods that addresses the complexity of life courses and their moderating role on the causal effect of retirement. The analysis proceeds in two steps: first, sequence analysis (SA) is used to derive gendered employment history clusters based on retrospective information on employment complexity and employment intensity during working age. Second, fixed effects two-stage least squares (FE-TSLS) models estimate whether the causal effects of retirement entry and retirement duration on cognitive functioning differ across clusters, exploiting exogenous variation in retirement timing induced by the statutory retirement age (SRA).

Building on the theoretical discussion, the study tests the following hypotheses. ***H1:*** Retirement entry reduces cognitive functioning due to the removal of employment-related cognitive stimulation (*use it or lose it*). ***H2:*** The adverse effect of retirement is smaller among individuals with more cognitively complex employment histories, consistent with greater *cognitive reserve*. ***H3:*** The adverse effect of retirement is less pronounced among individuals with higher intensity work careers (full-time employment as opposed to part-time employment or prolonged employment breaks), reflecting greater cumulative exposure to work-related cognitive stimulation (*cognitive reserve*).

2 Data Source, Sample Selection and Variables

2.1 Data Source

This study uses data from the Survey of Health, Ageing and Retirement in Europe (SHARE), an ongoing panel survey, covering health, social, and economic conditions of non-institutionalized people aged 50 and above and their co-residing partners in European countries and Israel (Bergman et al., 2019; Börsch-Supan et al., 2013). SHARE began with wave 1 (2004); the most recent available survey wave is wave 9 (2022). Unlike the regular SHARE waves, SHARELIFE waves 3 (2008-2009) and 7 (2017) collect detailed retrospective life history information, including educational and occupational biographies (Brugiavini et al., 2019). Country-level SRAs are obtained from the Mutual Information System on Social Protection database (European Commission, 2025). Table A1 in Appendix A reports the SRAs by country and interview years.

2.2 Sample Selection

The analytical sample is restricted to respondents aged 50 to 70 residing in Europe who, at the time of the interview, reported being either in the labour force (employed or unemployed) or retired. Respondents reporting “Homemaker”, "Permanently sick or disabled", or "Other" are excluded because these categories do not map unambiguously to labour force participation or retirement status. For retired respondents, observations are retained only if a retirement year was reported. Individuals who previously re-entered the labour force after retirement or reported inconsistent information concerning their retirement year are also removed from the sample. To ensure a well-defined risk of retirement under statutory rules, the sample is further restricted to individuals who were in the labour force at age 50. Furthermore, individuals are only retained if they participated in at least two SHARE waves, due to the FE-TSLS design relying on within-person changes, and if they participated in the immediate and delayed recall cognitive functioning tests.

All included respondents participated in a SHARELIFE wave and provided complete retrospective information on situation (working full-time, working part-time, unemployed, looking after home or children, retired, in training or education, sick or disabled, other), and occupation group during employment spells (according to the International Standard Classification of Occupations (ISCO-08) major occupation group) between the ages 15 and 50. The ISCO-08 can be mapped to skill levels 1 to 4, which capture the complexity and range of tasks and duties performed (International Labor Organization, 2025; International Labour Office, 2012) and have been used to proxy occupational cognitive stimulation in related studies (Coe et al., 2012; Greenberg & Burgard, 2021; Kajitani et al., 2017). Respondents who reported employment spells in the group “Armed Forces Occupations” are excluded from the sample, because assigned skill levels vary across subgroups, while SHARE only reports major group membership in this group. More detailed descriptions of the ISCO-08 occupation groups, their corresponding skill levels and their distribution in the samples are available in Appendix B (Table B1; Figures B1-2).

The final analytical samples comprise 49,174 person-year observations for 13,823 men and 43,961 person-year observations for 12,053 women.

2.3 Variables

The outcome variable covers episodic memory, a dimension of cognitive functioning particularly sensitive to ageing-related cognitive decline (Machado et al., 2018). The outcome is the combined score from the immediate and delayed word recall tests, ranging from zero to twenty total words recalled. In the immediate recall task, respondents are read a list of 10 words and asked to recall as many as possible within one minute. In the delayed recall task, administered a few minutes later, respondents are asked to recall words from the same list without rehearing them.

The two key covariates are retirement status (a binary variable indicating whether the respondent reported to be retired at the time of the interview) and retirement duration. Retirement duration is derived by subtracting the retirement year from the interview year. Information on the retirement year is obtained primarily from SHARELIFE using the life-history calendar measure that records the year the respondent's last job ended. When this information is missing, the retirement year information recorded in the regular SHARE wave (variable ep329 or ep050) is used.[1] SHARELIFE is prioritized because the event history calendar interview format is designed to improve the accuracy of retrospective dating (Schröder et al., 2011). Control variables include age squared to account for non-linear cognitive decline, and Learning, a binary indicator for first participation in the cognitive test to account for learning effects in cognitive functioning tests (Collie et al., 2003).

3 Analytical Strategy

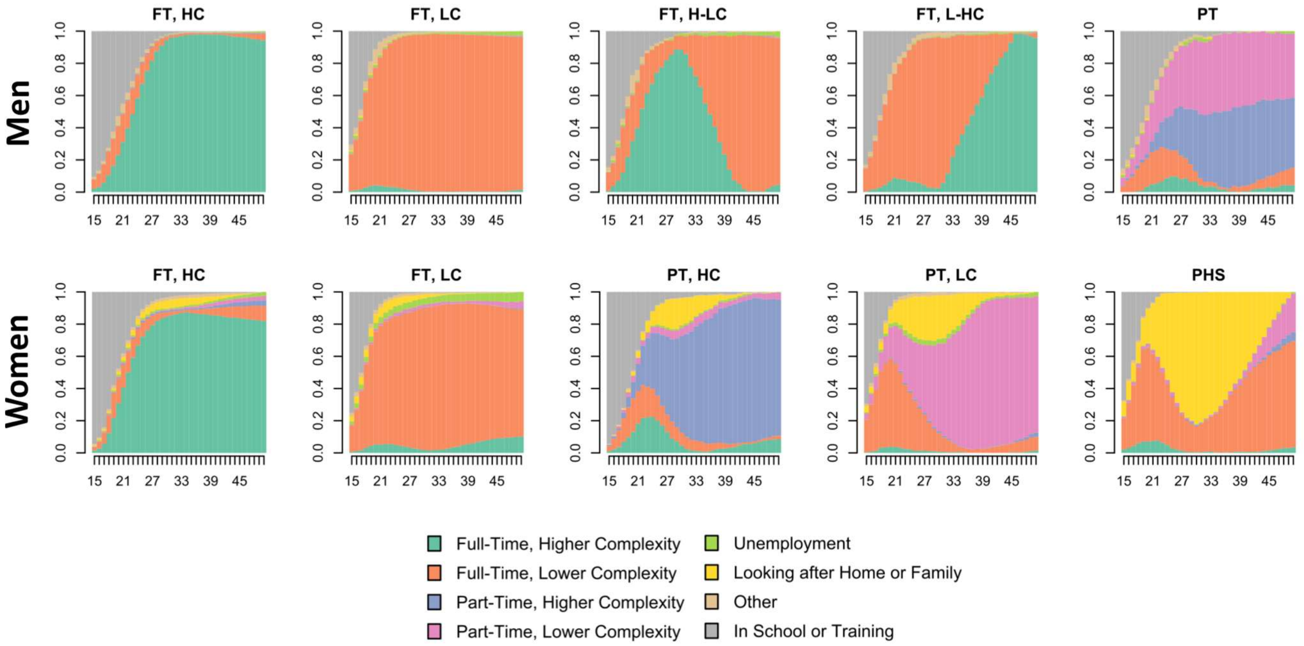
3.1 Step 1: Sequence Analysis

Before causal identification, SA is applied to derive employment history typologies to be used as independent variables in the causal analysis. SA is a longitudinal clustering approach that groups individuals based on ordered lists of a discrete set of elements (for instance, employment trajectories), accounting for the order and length of events (states) (Raab & Struffolino, 2023). For each age from 15 to 50, respondents are assigned to one of the following states: "full-time, more complex", "part-time, more complex", "full-time, less complex", "part-time, less complex", "unemployed", "looking after home or family", "retired", "in education" or "other". Employment was classified as more complex if the occupation involves complex technical and practical tasks that require extensive specialized knowledge, corresponding to ISCO skill levels 3 or 4, and as less complex if corresponding to lower skill levels (see Appendix B for details) (International Labour Office, 2012). The states therefore jointly capture employment status, employment intensity (full-time, part-time, or not employed), and employment complexity (higher or lower complexity employment). The remaining states are identical to the employment status.

1 In SHARE, variable ep329 is only available if an individual switched from employment to retirement in the last interview ("In what month and year did you retire?"). Otherwise, another question is asked, with the information stored in variable ep050 ("In which year did your last job end?").

To construct the dissimilarity matrix, I use dynamic Hamming distance, which accounts for the timing of states (Lesnard, 2010) and Ward's linkage for hierarchical clustering (Ward, 1963). SA was conducted separately for men and women to reflect gendered employment trajectories. I evaluated 2-10 cluster solutions using standard quality metrics (See Figure C1 in Appendix C). Based on these metrics and theoretical relevance, I select five clusters for women and five clusters for men (Figure 1).

Figure 1 State Distribution Plots for the Identified Employment History Clusters, Stratified by Gender



Note: Panels display, for each cluster, the age-specific distribution of states from age 15 to 50. Stacked bars represent the proportion of individuals in full-time (higher and lower complexity), part-time (higher and lower complexity) employment, unemployment, looking after home or family, other non-employment, and schooling or training at each age. The top row shows clusters for men, and the bottom row shows clusters for women. Abbreviations: **FT, HC** = Full-Time, Higher Complexity; **FT, LC** = Full-Time, Lower Complexity; **FT, H-LC** = Full-Time, Higher to Lower Complexity; **FT, L-HC** = Full-Time, Lower to Higher Complexity; **PT** = Part-Time; **PT, HC** = Part-Time, Higher Complexity; **PT, LC** = Part-Time, Lower Complexity; **PHS** = Prolonged Homemaking Spell.

3.2 Step 2: Identification Strategy

The objective is to estimate the causal effect of retirement on cognitive functioning. To establish causality, the identification strategy must account for the endogeneity between retirement and cognitive functioning. This endogeneity may be rooted in reverse causality, with cognitive health limiting or enhancing one's ability to pursue employment and thereby affecting the timing of retirement. Furthermore, omitted variable bias could be an issue. For instance, physical or psychological health or personality traits may affect both cognitive health in older age and the timing of retirement (Du et al., 2025; Martins et al., 2024; Sutin et al., 2019). To address these concerns, I implement an instrumental variable (IV) estimation strategy that exploits the institutional encouragement to retirement upon reaching the SRA. The resulting estimates identify a local average treatment effect (LATE) that is exogenously caused by reaching the SRA. This has two key advantages: first, the mechanism behind treatment assignment is clearly defined and tied to a single institutional rule, reducing ambiguity. Second, in the context of the SRA, it directly links the estimate to an existing policy lever, making the results more relevant for policymakers.

3.3 Model Specification

IV estimation is implemented in a FE-TSLS framework and estimated separately for men and women. Let Y_{it} denote episodic memory of individual i in interview year t, and let RET_{it} be an indicator equal to one if the individual is retired at the time of interview. The second-stage equation reads as follows:

$$\mathrm{Y}_{it} = \widehat{RET}_{it}[\beta^{(0)} + \sum_{j \neq re} \beta^{(j)} D_{ij}] + X_{it}\gamma + \alpha_i + \lambda_t + u_{it},$$

relating episodic memory to the retirement status and its interaction with employment history cluster D_{ij}, allowing for the estimation of cluster-specific effects (Wooldridge, 2010). Controls X_{it} include age squared and Learning. α_i are individual fixed effects and λ_t are interview year fixed effects.[2] u_{it} denotes the error term. Standard errors are clustered at the individual level. The coefficients $\beta^{(0)}$, $\beta^{(j)}$, and γ are parameters to be estimated, with $\beta^{(0)}$ representing the LATE for the reference cluster (Full-Time, Higher Complexity (FT, HC)), and $\beta^{(0)} + \beta^{(k)}$, representing the LATE for compliers in cluster $k \neq ref$.

The corresponding first stage is

$$RET_{it} = Z_{it}^{RET}[\pi^{(0)} + \sum_{j \neq ref} \pi^{(j)} D_{ij}] + X_{it}\rho + \alpha_i + \lambda_t + \upsilon_{it},$$

where Z_{it}^{RET} and $Z_{it}^{RET} \times D_{ij}$ are the instruments, with Z_{it}^{RET} indicating whether the respondent's age crosses the SRA, that is, $Z_{it} = \mathbb{1}(AGE_{it} \geq SRA_{it})$. First stages are estimated as ordinary least squares regressions, since a logit-regression would lead to a forbidden second stage due to non-linearity of the first stage (Hausman, 1975). I use the AER package in R for the estimation (Kleiber & Zeileis, 2008).

As retirement effects may require time to materialize, I follow prior literature and additionally estimate a specification investigating 1-year lagged effects (Model 2), using the endogenous regressor $RET_{i\,t-1}$ and instrument $Z_{i\,t-1}^{RET}$ (Bianchini & Borella, 2016; Bonsang et al., 2012).

In Model 3, I estimate the effect of retirement duration by replacing RET_{it} in the second stage with the retirement duration DUR_{it}, defined as years since retirement (0 for those not yet retired). Duration is instrumented by $max(0, AGE_{it} - SRA)$ and its interactions with employment history cluster membership.

[2] Note that due to including interview year fixed effects, the variable age is not separately identified and is therefore not included as a covariate.

3.4 Identifying Assumptions

For the IV design to identify a LATE, identifying assumptions must hold. The Stable Unit Treatment Value Assumption (SUTVA) requires non-interference between units, stating that the potential outcomes of one unit do not depend on the treatment status of another unit, and no variations in the treatment (treatment is well-defined) (Angrist & Pischke, 2009). Given evidence on spillover effects of retirement on spouses' health (Müller & Shaikh, 2018; Zang, 2020), interference between couples is a potential identification threat. Due to stratifying by gender, the analytical samples each include only ten couples (two in the sample of women and eight in the sample of men).

The relevance assumption requires that instruments induce non-trivial variation in the probability of retirement (Angrist & Pischke, 2009). To test this, I report for each retirement × cluster regressor the cluster-robust Kleibergen-Paap Wald rk F-statistics, which test for weak identification accounting for clustering at the individual level (Kleibergen & Paap, 2006). In all specifications, F-statistics are well above the conventional weak-instrument threshold ($F > 10$) (Stock & Watson, 2015). Detailed first stage regression results and F-statistics are presented in Tables D1-2 in Appendix D.

The independence assumption requires instruments to be as good as randomly assigned conditional on the controls and fixed effects, i.e., uncorrelated with the structural error term. In the context of statutory retirement, eligibility is determined mechanically by date of birth and legislation and therefore cannot be influenced by individuals' cognitive functioning or other idiosyncratic shocks. Exceptions to this rule are the Czech Republic and Slovakia, where the SRA of women depends on their number of children. Considering that the number of children has been connected to cognitive functioning (Bonsang & Skirbekk, 2022; Bordone & Weber, 2013), retaining these observations in the sample may cause non-random assignment of the instrument and thus violate the independence assumption. I therefore exclude these observations from the analysis. The interacted instruments are plausibly exogenous because employment history clusters are predetermined by earlier labour market trajectories rather than by health conditions at the time of becoming eligible for retirement.

The exclusion restriction requires the instrument to affect the outcome only through changing the treatment; ergo, reaching the SRA affects cognitive functioning only through incentivizing individuals to retire. While many factors directly affect cognitive functioning, I argue that reaching the SRA is not among them.

Finally, the monotonicity assumption requires that SRA eligibility does not incentivize defying behaviour for any respondent. In other words, it must not incentivize any individual to unretire. Given the eligibility for full public pension benefits when reaching retirement age, as well as cultural norms, I do not expect that passing the SRA incentivizes labour force re-entry among retirees.

As a robustness check, addressing the potential violation of the SUTVA through treatment spillover effects in couples, I remove all couples from the samples. In a sensitivity check, models are re-estimated with the immediate and the delayed recall test scores as outcomes.

4 Results

4.1 Descriptive Results

Men. The state distribution plots in Figure 1 show that for men, the clusters FT, HC and Full-Time, Lower Complexity (FT, LC) include individuals who were predominantly employed in higher complexity and lower complexity full-time employment, respectively. Men who switched between more or less complex employment throughout their careers are in clusters Full-Time, Higher to Lower Complexity (FT, H-LC) and Full-Time, Lower to Higher Complexity (FT, L-HC). The cluster Part-Time (PT) includes men who mainly worked part-time.

Table 1 reports cluster-specific descriptive statistics. Among men, overall mean episodic memory is 9.77 (SD = 3.23) words recalled out of 20. Mean episodic memory scores range from 9.15 (SD = 3.16) among men in FT, LC to 10.68 (SD = 3.12) in FT, HC. Men in PT also show comparatively high mean episodic memory (10.38, SD = 3.34), while men transitioning from high-to-low and low-to-high complexity (FT, H-LC; FT, L-HC) have intermediate mean scores (9.99, SD = 3.15 and 10.15, SD = 3.11, respectively). Descriptively, episodic memory increases with occupational complexity in men.

Table 1 Descriptive Statistics

Men	**FT, HC**	**FT, LC**	**FT, H-LC**	**FT, L-HC**	**PT**	**Total**
Episodic Memory (Mean (SD))	**10.68 (3.12)**	**9.15 (3.16)**	**9.99 (3.15)**	**10.15 (3.11)**	**10.38 (3.34)**	**9.77 (3.23)**
Retired (%)	**48.22**	**53.83**	**41.28**	**44.70**	**39.03**	**50.86**
At or above SRA (%)	**38.31**	**37.75**	**34.45**	**35.82**	**27.73**	**37.60**
Age (Mean (SD))	**61.86 (5.30)**	**61.75 (5.31)**	**61.34 (5.20)**	**61.52 (5.35)**	**60.50 (5.23)**	**61.74 (5.31)**
Birth Year (Median (Q1, Q3))	**1952 (1947, 1956)**	**1952 (1948, 1957)**	**1953 (1948, 1956)**	**1952 (1947, 1956)**	**1954 (1950, 1957)**	**1952 (1948, 1956)**
Educational Attainment						
Lower Secondary (%)	**10.29**	**37.54**	**19.68**	**18.61**	**17.50**	**26.42**
Secondary (%)	**33.22**	**52.19**	**53.71**	**53.94**	**36.20**	**45.63**
Tertiary (%)	**55.27**	**8.99**	**25.52**	**25.96**	**44.41**	**26.67**
Unclear (%)	**1.22**	**1.27**	**1.08**	**1.50**	**1.88**	**1.27**
Observations	**16,741**	**27,621**	**1,199**	**2,870**	**743**	**49,174**
Individuals (Transitioned %)	**4,548 (36.63)**	**7,979 (33.59)**	**330 (38.79)**	**780 (34.87)**	**186 (43.55)**	**13,823 (34.92)**
Women	**FT, HC**	**FT, LC**	**PT, HC**	**PT, LC**	**PHS**	**Total**
Episodic Memory (Mean (SD))	**11.62 (3.17)**	**10.22 (3.24)**	**12.16 (2.98)**	**10.86 (3.20)**	**10.25 (3.24)**	**10.93 (3.27)**
Retired (%)	**45.16**	**52.60**	**41.29**	**45.77**	**48.76**	**48.20**
At or above SRA (%)	**39.26**	**41.17**	**31.46**	**34.45**	**43.53**	**39.33**
Age (Mean (SD))	**61.06 (5.45)**	**61.12 (5.45)**	**60.57 (5.50)**	**60.74 (5.59)**	**61.31 (5.55)**	**61.04 (5.47)**
Birth Year (Median (Q1, Q3))	**1954 (1949, 1958)**	**1953 (1949, 1958)**	**1953 (1948, 1957)**	**1953 (1948, 1958)**	**1952 (1948, 1956)**	**1953 (1949, 1958)**
Educational Attainment						
Lower Secondary (%)	**7.37**	**33.89**	**7.67**	**35.26**	**42.56**	**22.81**
Secondary (%)	**34.94**	**51.49**	**37.69**	**52.29**	**46.55**	**44.13**
Tertiary (%)	**57.08**	**13.81**	**53.20**	**11.69**	**9.45**	**32.25**
Unclear (%)	**0.61**	**0.81**	**1.45**	**0.76**	**1.43**	**0.81**
Observations	**16,479**	**17,960**	**2,972**	**3,968**	**2,582**	**43,961**
Individuals (Transitioned %)	**4,444 (33.71)**	**5,070 (30.47)**	**728 (45.05)**	**1,068 (37.83)**	**743 (35.80)**	**12,053 (33.53)**

Note: Summary statistics by employment history cluster and gender. The row Individuals (Transitioned %) represents the number of individuals in each cluster and, in brackets, the share of those individuals who transitioned from the labour force to retirement between waves. Educational attainment category "*Unclear*" includes observations of individuals who refused to state their educational attainment level, answered *Don't know*, or *Other*. Abbreviations: **FT, HC** = Full-Time, Higher Complexity; **FT, LC** = Full-Time, Lower Complexity; **FT, H-LC** = Full-Time, Higher to Lower Complexity; **FT, L-HC** = Full-Time, Lower to Higher Complexity; **PT** = Part-Time; **PT, HC** = Part-Time, Higher Complexity; **PT, LC** = Part-Time, Lower Complexity; **PHS** = Prolonged Homemaking Spell.

Men's educational attainment levels are patterned by their clusters' job complexity: men in FT, HC are predominantly tertiary educated (55.27 percent), whereas men in FT, LC are mainly educated to the secondary level (52.19 percent) or below (37.54 percent), with only a small proportion holding tertiary education (8.99 percent). The transition clusters FT, H-LC and FT, L-HC fall in between, with roughly one-quarter tertiary education (25.52 and 25.96 percent) and a majority with secondary education (53.71 and 53.94 percent). The PT cluster displays comparatively high educational attainment levels with 44.41 percent holding tertiary, 36.20 percent secondary, and 17.50 percent up to lower secondary education.

Women. For women, the clusters FT, HC and FT, LC show highly similar employment history patterns as the same groups of men. The clusters Part-Time, Higher Complexity (PT, HC) and Part-Time, Lower Complexity (PT, LC) include women who mainly worked part-time and in high or low complexity jobs, respectively. Among women in the two part-time clusters, homemaking spells are more prevalent as compared to those in the clusters characterized by full-time employment. The cluster Prolonged Homemaking Spell (PHS) mainly includes women who were out of the labour force for a prolonged period of time, looking after their homes or children, while later re-entering employment.

Among women, mean episodic memory is 10.93 (SD = 3.27) overall. As for men, in women, higher employment complexity clusters display the highest mean scores (PT, HC: 12.16, (SD = 2.98); FT, HC: 11.62 (SD = 3.17)). Lower mean scores are observed for the lower job complexity clusters (PT, LC: 10.86 (SD = 3.20); FT, LC: 10.22 (SD = 3.24)) and for the cluster PHS (10.25 (SD = 3.24)). As with men, education is patterned by job complexity: women in higher complexity employment were predominantly tertiary educated (57.08 percent in FT, HC; 53.20 percent in PT, HC). In contrast, women in lower complexity employment and those with a prolonged homemaking spell are more often educated to the secondary level or below (e.g., FT, LC: 51.49 percent secondary and 33.89 percent below; PT, LC: 52.29 percent secondary and 35.26 percent below; PHS: 46.55 percent secondary and 42.56 percent below), with comparatively low shares holding tertiary education.

4.2 Multivariate Results

Tables 2 and 3 report the FE-TSLS estimates and cluster-specific LATEs of retirement on episodic memory. Figure 2 visualizes cluster-specific LATEs including 95 percent-confidence intervals. Three specifications are presented: Model 1 uses the contemporaneous retirement indicator R_t; Model 2 uses the lagged retirement indicator capturing being retired for at least one year, R_{t-1}; and Model 3 estimates the effect of retirement duration, DUR_{it}.

Table 2 FE-TSLS Regression Results

Men	Model 1 ($\mathrm{RET_t}$)	Model 2 ($\mathrm{RET_{t-1}}$)	Model 3 ($\mathrm{DUR_t}$)
Effect *(Ref.: FT, HC)*	**-0.245 (0.222)**	**-0.316 (0.237)**	**-0.089*** (0.021)**
Interactions			
Effect × FT, LC	**-0.285. (0.150)**	**-0.312* (0.148)**	**-0.005 (0.015)**
Effect × FT, H-LC	**-0.615. (0.340)**	**-0.526 (0.385)**	**-0.043 (0.046)**
Effect × FT, L-HC	**-0.510. (0.281)**	**-0.371 (0.275)**	**-0.056. (0.032)**
Effect × PT	**1.124** (0.402)**	**1.333** (0.434)**	**0.112* (0.055)**
$\mathrm{Age}^2/100$	**-0.154*** (0.028)**	**-0.121*** (0.036)**	**-0.029 (0.037)**
Learning	**0.254*** (0.041)**	**0.267*** (0.040)**	**0.282*** (0.039)**
Adjusted R^2	**0.485**	**0.485**	**0.485**
Min KP F	**53.5**	**56.2**	**37.3**
Observations	**49,174**	**49,174**	**49,174**
Individuals	**13,823**	**13,823**	**13,823**
Women	**Model 1 ($\mathrm{RET_t}$)**	**Model 2 ($\mathrm{RET_{t-1}}$)**	**Model 3 ($\mathrm{DUR_t}$)**
Effect *(Ref.: FT, HC)*	**0.395* (0.199)**	**0.016 (0.232)**	**-0.049* (0.021)**
Interactions			
Effect × FT, LC	**-0.154 (0.172)**	**-0.310. (0.179)**	**-0.029. (0.017)**
Effect × PT, HC	**-0.217 (0.237)**	**-0.408 (0.249)**	**-0.038 (0.031)**
Effect × PT, LC	**-0.438. (0.231)**	**-0.387. (0.232)**	**-0.031 (0.026)**
Effect × PHS	**-0.167 (0.263)**	**-0.227 (0.264)**	**-0.020 (0.030)**
$\mathrm{Age}^2/100$	**-0.154*** (0.028)**	**-0.123** (0.033)**	**-0.033 (0.038)**
Learning	**0.188*** (0.044)**	**0.160*** (0.043)**	**0.182*** (0.042)**
Adjusted R^2	**0.505**	**0.505**	**0.505**
Min KP F	**159.1**	**164.3**	**232.4**
Observations	**43,961**	**43,961**	**43,961**
Individuals	**12,053**	**12,053**	**12,053**

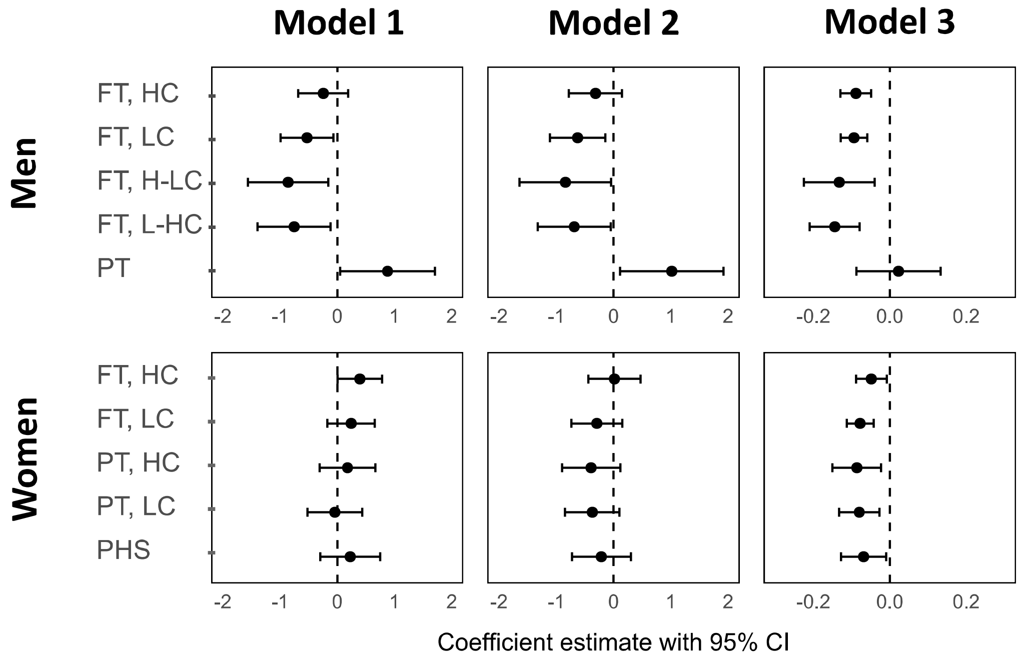
Note: FE-TSLS coefficient estimates with individual- and interview year-fixed effects. The row *Effect* reports the LATE for the reference cluster *FT, HC*. Standard errors are clustered at the individual level. The row *Min KP F* represents the minimum employment history cluster-specific Kleibergen–Paap Wald rk statistic, accounting for clustering at the individual level. In all models, the minimum statistics exceed 10, indicating strong instruments for all cluster-specific effects. Cluster-specific LATEs are reported in Table 3. Significance levels: . p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001. Abbreviations: **FT, HC** = Full-Time, Higher Complexity; **FT, LC** = Full-Time, Lower Complexity; **FT, H-LC** = Full-Time, Higher to Lower Complexity; **FT, L-HC** = Full-Time, Lower to Higher Complexity; **PT** = Part-Time; **PT, HC** = Part-Time, Higher Complexity; **PT, LC** = Part-Time, Lower Complexity; **PHS** = Prolonged Homemaking Spell.

Table 3 Cluster-Specific Local Average Treatment Effects on Episodic Memory, and Differences Relative to the Reference Cluster

	Model 1 (RET_t)		Model 2 (RET_{t-1})		Model 3 (DUR_t)	
Cluster	**LATE**	**Interaction (Ref.: FT, HC)**	**LATE**	**Interaction (Ref.: FT, HC)**	**LATE**	**Interaction (Ref.: FT, HC)**
Men						
FT, HC	**-0.245**	**Ref.**	**-0.316**	**Ref.**	**-0.089*****	**Ref.**
	(0.222)		**(0.237)**		**(0.021)**	
FT, LC	**-0.529***	**-0.285.**	**-0.627***	**-0.312***	**-0.094*****	**-0.005**
	(0.235)	**(0.150)**	**(0.246)**	**(0.148)**	**(0.018)**	**(0.015)**
FT, H-LC	**-0.859***	**-0.615.**	**-0.842***	**-0.526**	**-0.132****	**-0.043**
	(0.358)	**(0.340)**	**(0.408)**	**(0.385)**	**(0.047)**	**(0.046)**
FT, L-HC	**-0.754***	**-0.510.**	**-0.687***	**-0.371**	**-0.145*****	**-0.056.**
	(0.324)	**(0.281)**	**(0.326)**	**(0.275)**	**(0.033)**	**(0.032)**
PT	**0.879***	**1.124****	**1.018***	**1.333****	**0.023**	**0.112***
	(0.423)	**(0.402)**	**(0.461)**	**(0.434)**	**(0.056)**	**(0.055)**
Women						
FT, HC	**0.395***	**Ref.**	**0.016**	**Ref.**	**-0.049***	**Ref.**
	(0.199)		**(0.232)**		**(0.021)**	
FT, LC	**0.241**	**-0.154**	**-0.293**	**-0.310.**	**-0.078*****	**-0.029.**
	(0.212)	**(0.172)**	**(0.227)**	**(0.179)**	**(0.018)**	**(0.017)**
PT, HC	**0.178**	**-0.217**	**-0.391**	**-0.408**	**-0.087****	**-0.038**
	(0.248)	**(0.237)**	**(0.260)**	**(0.249)**	**(0.033)**	**(0.031)**
PT, LC	**-0.043**	**-0.438.**	**-0.371**	**-0.387.**	**-0.080****	**-0.031**
	(0.245)	**(0.231)**	**(0.242)**	**(0.232)**	**(0.027)**	**(0.026)**
PHS	**0.228**	**-0.167**	**-0.211**	**-0.227**	**-0.068***	**-0.020**
	(0.267)	**(0.263)**	**(0.262)**	**(0.264)**	**(0.030)**	**(0.030)**

Note: Cluster-specific LATEs from the three main models for men and women. For each cluster, the LATE equals the main effect plus the cluster interaction term and is tested against zero using Wald tests based on the clustered variance-covariance matrix. The column *Interaction (Ref.: FT, HC)* reports the interaction coefficient only, which tests whether the retirement effect in that cluster differs from the effect in the reference cluster. Standard errors are clustered at the individual level. Significance levels: . p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001. Abbreviations: **FT, HC** = Full-Time, Higher Complexity; **FT, LC** = Full-Time, Lower Complexity; **FT, H-LC** = Full-Time, Higher to Lower Complexity; **FT, L-HC** = Full-Time, Lower to Higher Complexity; **PT** = Part-Time; **PT, HC** = Part-Time, Higher Complexity; **PT, LC** = Part-Time, Lower Complexity; **PHS** = Prolonged Homemaking Spell.

Figure 2 Cluster-Specific Local Average Treatment Effects with 95-Percent Confidence Intervals for Men and Women



Note: The upper panels show the LATE estimates in words recalled for men, the lower panels the estimates for women, by employment history cluster. The first, second, and third column of panels represent main models **Model 1** (retirement), **Model 2** (retirement after one year), and **Model 3** (retirement duration), respectively. Abbreviations: **FT, HC** = Full-Time, Higher Complexity; **FT, LC** = Full-Time, Lower Complexity; **FT, H-LC** = Full-Time, Higher to Lower Complexity; **FT, L-HC** = Full-Time, Lower to Higher Complexity; **PT** = Part-Time; **PT, HC** = Part-Time, Higher Complexity; **PT, LC** = Part-Time, Lower Complexity; **PHS** = Prolonged Homemaking Spell.

Men. In Model 1, the estimated LATE for compliers in the reference cluster (FT, HC) is not statistically distinguishable from zero. In contrast, retirement is estimated to reduce episodic memory among compliers in clusters characterized by sustained full-time employment with extended exposure to lower complexity work. Estimated LATEs are negative for FT, LC ($LATE_{FT,LC} = -0.529$), FT, L-HC ($LATE_{FT,L-HC} = -0.754$), FT, H-LC ($LATE_{FT,H-LC} = -0.859$), all statistically significant at the 5 percent level. Relative to the FT, HC reference group, the corresponding interaction terms are also negative, although differences are only supported at the 10 percent level. A notable exception is the PT cluster: for these compliers, retirement is estimated to benefit episodic memory ($LATE_{PT} = 0.879$, $p < 0.05$), and the differential effect relative to the FT, HC reference cluster is sizeable and statistically significant ($\beta_{PT} = 1.124, p < 0.01$).

Model 2 (retired for at least one year) closely mirrors the results in Model 1. The reference cluster (FT, HC) effect remains statistically indistinguishable from zero, while negative and statistically significant LATEs persist in the lower complexity full-time clusters ($LATE_{FT,LC} = -0.627$; $LATE_{FT,L-HC} = -0.687$; $LATE_{FT,H-LC} = -0.842$; $p < 0.05$). The PT cluster continues to show a positive and significant effect ($LATE_{PT} = 1.018, p < 0.05$). Moreover, the differences in effects relative to the FT, HC cluster are statistically significant for FT, LC ($\beta_{FT,LC} = -0.312, p < 0.05$) and PT ($\beta_{PT} = 1.333, p < 0.01$), suggesting heterogeneous retirement effects.

In Model 3, which focuses on retirement duration, estimated effects become uniformly negative for all full-time clusters, regardless of work complexity. Across these clusters, each additional year in retirement is estimated to cause a reduction of approximately 0.09 to 0.15 words recalled among compliers ($LATE_{FT,HC} = -0.089, p < .001$; $LATE_{FT,LC} = -0.094, p < 0.001$; $LATE_{FT,L-HC} = -0.145, p < 0.001$; $LATE_{FT,H-LC} = -0.132, p < 0.001$). By contrast, the estimated duration effect is not statistically different from zero in the PT cluster, but it is significantly less negative than in the FT, HC reference cluster ($\beta_{PT} = 0.112, p < 0.05$). Overall, these results suggest that among men, spending time in retirement causes episodic memory declines primarily for those coming from sustained full-time employment, regardless of prior job complexity, whereas I find no such evidence for compliers with part-time trajectories.

Women. For women, Model 1 indicates a positive retirement effect for compliers in the FT, HC cluster: the estimated $LATE_{FT,HC}$ is 0.395 ($p < 0.05$), suggesting modest improvements in episodic memory for women with sustained full-time, higher complexity careers. For the remaining clusters, characterized by lower work intensity and/or lower job complexity, estimated LATEs are not statistically distinguishable from zero. Relative to FT, HC, effects appear less favourable in the PT, LC cluster, although this contrast is supported only at the 10 percent level ($\beta_{PT,LC} = -0.438, p < 0.1$).

In Model 2, estimated cluster-specific LATEs are not statistically significant. However, contrasts relative to the FT, HC reference cluster provide suggestive evidence that effects may be less favourable in lower-complexity clusters (FT, LC and PT, LC), with estimated differences relative to the FT, HC cluster $\beta_{FT,LC} = -0.310$ and $\beta_{PT,LC} = -0.387$, albeit significant only at the 10 percent level.

In Model 3, across all clusters of women, retirement duration is estimated to adversely affect episodic memory. The estimated retirement duration LATE ranges from -0.049 words per year for the FT, HC cluster ($p < 0.05$) to -0.087 words per year for the PT, HC cluster ($p < 0.01$). Interaction terms relative to the FT, HC reference cluster do not reach conventional levels of statistical significance, indicating that retirement duration-related cognitive decline is broadly similar across employment clusters.

Excluding couples from the samples does not change the direction or statistical significance of the results (as detailed in Table E1 in Appendix E). Sensitivity checks using the immediate and the delayed recall scores as separate outcomes show patterns consistent with the main results, although statistical support for some cluster-specific LATEs is weaker (Tables E2-3; Figure E1 in Appendix E).

5 Discussion

This study examined whether the causal effect of retirement on cognitive functioning differs across employment history trajectories that capture variation in work intensity and occupational complexity, applying a gendered lens. Using a FE-TSLS design in which reaching the SRA instruments retirement, I estimated cluster-specific retirement effects for individuals whose retirement behaviour is shifted by SRA eligibility.

In the results, three patterns stand out. First, for men, contemporaneous retirement effects are heterogeneous across employment histories: retirement is estimated to reduce episodic memory among compliers in clusters characterized by sustained exposure to lower-complexity work, whereas compliers with predominantly part-time trajectories exhibit positive contemporaneous effects. Second, for women, heterogeneity in contemporaneous retirement effects is comparatively limited: evidence of a positive retirement effect is concentrated in the full-time, higher-complexity cluster, while differences across clusters are generally weakly supported statistically. Third, for both genders, the estimated effect of retirement duration is predominantly negative, with cognitive declines observed across full-time clusters for men and across all clusters for women.

The hypothesis that transitioning into retirement harms post-retirement cognitive functioning (H1), grounded on the use it or lose it hypothesis, is mostly supported by the results in Model 3, estimating a negative retirement duration effect for all clusters across genders but the male PT cluster, where the effect is indistinguishable from zero. At the same time, the mixed findings in Models 1 and 2 indicate pronounced heterogeneity in short-term retirement effects, even changing sign for two clusters. Taken together, the results mostly support the use it or lose it hypothesis in the long run but, in the short-term, indicate that other mechanisms may partially offset the loss of work-related cognitive stimulation.

One such mechanism may be the protective effect of cognitive reserve, accumulated through higher complexity employment throughout working age (H2). Evidence for the role of cognitive reserve is most apparent in the short-run patterns. In the contemporaneous and lagged models for men, negative retirement effects are more pronounced in clusters with lower occupational complexity compared to the FT, HC cluster. The results are thus consistent with research finding the complexity of the longest held profession to mitigate adverse retirement effects among men (Kajitani et al., 2017).

Among women, the presence of a positive contemporaneous retirement effect in the full-time, higher-complexity cluster, paired with weaker or null effects in lower-complexity clusters, further hints at the importance of cognitive reserve. The positive effect also suggests that women might experience retirement more positively than men with similar trajectories. A potential mechanism is the gender-specific structure and utilization of post-retirement social networks, which function as a compensatory source of cognitive stimulation. Specifically, research reports that women generally have larger and more diverse social networks post-retirement than men (Cohn-Schwartz & Naegele, 2024; Lim-Soh & Lee, 2023). Furthermore, research shows that post-retirement, women tend to be more innovative in their pursuit of activities whereas men prefer to continue engaging in leisure activities they pursued before retirement (Jaumot-Pascual et al., 2016). Additionally, some evidence indicates that engagement with weaker social ties may be particularly protective against women's cognitive ageing (Liao & Scholes, 2017; Zunzunegui et al., 2003).

The results provide little support for the hypothesis that lower employment intensity, captured by prolonged part-time employment or homemaking spells, systematically exacerbates adverse retirement effects (H3). Instead, the estimates in Models 1 and 2 suggest substantial positive retirement effects in male compliers in the PT cluster. This finding should be interpreted cautiously given considerable heterogeneity within this cluster in terms of educational attainment and occupational complexity (Figure 1; Table 1). However, research has shown that male long-term part-time employment is frequently involuntary and characterized by labour market or informal caregiving constraints (Thompson & Wheatley, 2019), lower job quality, job satisfaction, and ill health (Mäkinen et al., 2023; Warren & Lyonette, 2020). In this context, retirement may constitute a relief from burdensome work conditions, improving mental and physical health, and in turn, translating into cognitive benefits (Du et al., 2025; Martins et al., 2024; Vance et al., 2016).

The findings speak directly to debates on raising statutory retirement ages and encouraging longer working lives. On the one hand, the negative effects observed for men in full-time clusters, especially those with sustained low-complexity employment, imply that postponing retirement may be cognitively protective for these groups. On the other hand, positive contemporaneous retirement effects among men with part-time trajectories and women with full-time, higher complexity trajectories, caution that universal policy prescriptions may be misguided. For these individuals, retirement eligibility may function as a safety valve, reducing psychological stress and freeing up time to engage socially. In this context, policies that pair a legal retirement age with a flexible claiming window and actuarially calibrated adjustments may be preferable, allowing individuals to better align retirement decisions with their broader life course contexts.

Several limitations should be noted. First, because SRA eligibility is used as an instrument, the estimates identify LATEs for compliers and should not be generalized to individuals who retire for other reasons, such as early retirement, which is frequently driven by poor health, strenuous working conditions, or lower financial dependence on one's job (Stattin & Bengs, 2022; Topa et al., 2018). Second, although the FE-TSLS strategy addresses time-invariant confounding and reverse causality concerns, selection into higher-complexity occupations may still reflect unobserved traits related to cognitive resilience and skills. As a result, differences across occupational trajectories may partly capture sorting rather than the cumulative effect of cognitive stimulation per se. This concern is underlined by the positive correlation between education and occupational complexity (Table 1), highlighting the need to further disentangle baseline cognitive skills from lifetime cognitive stimulation.

In summary, while prior research often reported inconsistent results concerning retirement effects on cognitive functioning, this paper used a novel combination of statistical methods to disentangle retirement effects that considers the role of gendered employment histories. The results show substantial heterogeneities, hinting at the importance of specific contexts along the life course for retirement effects on cognitive functioning. Future research could build on these findings in two directions. First, integrating measures of post-retirement cognitive stimulation, such as social engagement, would help clarify which compensatory mechanisms account for the short-run heterogeneities in retirement effects. Second, further work should examine how education, occupational complexity, and job quality jointly shape cognitive resilience in later life.

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Appendices

A Statutory Retirement Ages

Table A1 Statutory Retirement Ages per Interview Year for Men and Women (Men, Women)

Country	2004	2005	2006	2007	2010	2011	2012	2013	2015	2017	2018	2019	2020	2021	2022
Austria	65, 60	65, 60	65, 60	65, 60	65, 60	65, 60	65, 60	65, 60	65, 60	65, 60	65, 60	65, 60	65, 60	65, 60	65, 60
Belgium	65, 63	65, 63	65, 64	65, 64	65	65	65	65	65	65	65	65	65	65	65
Bulgaria									63.67 60.67	64 61	64.08 61.17	64.17 61.33	64.25 61.5	64.33 61.67	64.42 61.83
Croatia									65 61.25	65 61.75	65 62	65 62.33	65 62.5	65 62.75	65 63
Cyprus									65	65	65	65	65	65	65
Czech Republic⁺			61.50, 55.67 - 59.67	61.67, 56-60	62.17, 56.67 - 60.67	62.33, 56.67 - 60.67	62.50, 57.33 - 61.33	62.50, 57.33 - 61.33	62.83, 58-62	63.17, 58.67 - 62.67	63.33, 58.67 - 62.67	63.50, 59.17 - 63.17	63.67, 59.67 - 63.67	63.83, 59.67 - 63.83	63.83, 60.17 - 63.83
Denmark			65	65	65	65	65	65	65	65	65	65.5	66	66.5	67
Estonia					63, 61	63, 61.50	63, 61.75	63, 62	63, 62.5	63.25	63.5	63.75	63.75	64	64.25
Finland*	63-65	63-65	63-65	63-65	63-65	63-65	63-65	63-65	63-65	63-65	63-65	63-65	63-65	63-65	63-65
France*	62-64	62-64	62-64	62-64	62-64	62-64	62-64	62-64	62-64	62-64	62-64	62-64	62-64	62-64	62-64
Germany*	65	65	65	65	65	65	65-67	65-67	65-67	65-67	65-67	65-67	65-67	65-67	65-67
Greece	65, 65	65, 65	65, 65	65, 65					62	62	62	62	62	62	62
Hungary						62-65	62-65	62-65	62-65	62-65	62-65	62-65	62-65	62-65	62-65
Italy	65, 60	65, 60	65, 60	65, 60	65, 60	65, 60	66, 62	66.25, 62.25	66.25, 63.75	66.58, 65.58	66.58	67	67	67	67
Latvia										63	63.25	63.5	63.8	64	64.25
Lithuania										63.5, 62	63.67, 62.33	63.83, 62.67	64, 63	64.17, 63.33	64.33, 63.67
Luxembourg							65	65	65	65	65	65	65	65	65
Malta*	61, 60	61, 60	61, 60	61-65, 60-65	61-65, 60-65	61-65, 60-65	61-65, 60-65	61-65, 60-65	61-65, 60-65	61-65, 60-65	61-65, 60-65	61-65, 60-65	61-65, 60-65	61-65, 60-65	61-65, 60-65
Netherlands	65	65	65	65	65	65	65	65.08			66	66.33	66.33	66.33	66.58
Poland			65, 60	65, 60		65, 60	65, 60	65, 60	65, 60	65, 60	65, 60	65, 60	65, 60	65, 60	65, 60
Portugal					65	65	65	65	66	66.25	66.33	66.42	66.42	66.5	66.58
Romania										65, 60.58	65, 60.58	65, 61	65, 61	65, 61.58	65, 61.83
Slovakia⁺										62.21	62.38	62.50	62.58, 61.08 - 62.58	62.67, 61.17 - 62.67	62.75, 61.25 - 62.75
Slovenia					63, 61	63, 61	63, 61	65	65	65	65	65	65	65	65
Spain	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65
Sweden	65	65	65	65	65	65	65	65	65	65	65	65	65	65	65
Switzerland	65, 63	65, 64	65, 64	65, 64	65, 64	65, 64	65, 64	65, 64	65, 64	65, 64	65, 64	65, 64	65, 64	65, 64	65, 64

Note. Statutory retirement ages (SRA) for all countries in the sample in the interview years (Men, Women). Single numbers or ranges apply to both genders. Symbols: ⁺ indicates that women's SRA depend on the number of children (Czech Republic; Slovakia), * indicates that the SRA depends on the birth year (Finland, France, Germany, Malta).

B International Standard Classification of Occupations-08 (ISCO-08)

In this study, employment spells were classified into higher- or lower-complexity occupations based on the ISCO-08 classification system (International Labour Office, 2012). Occupations assigned an ISCO skill level of 3 or 4 (out of 4 possible levels) were categorized as higher-complexity employment, whereas occupations assigned a skill level of 1 or 2 were categorized as lower-complexity employment.

Occupations with skill level 1 involve basic physical or manual tasks. Occupations with skill level 2 involve tasks that require reading information, creating written records, and performing simple arithmetical calculations. Skill level 3 involves complex tasks that require extensive specialized knowledge. Skill level 4 involves tasks requiring complex problem-solving, decision-making and creativity in the context of a specialized field (International Labour Office, 2012).

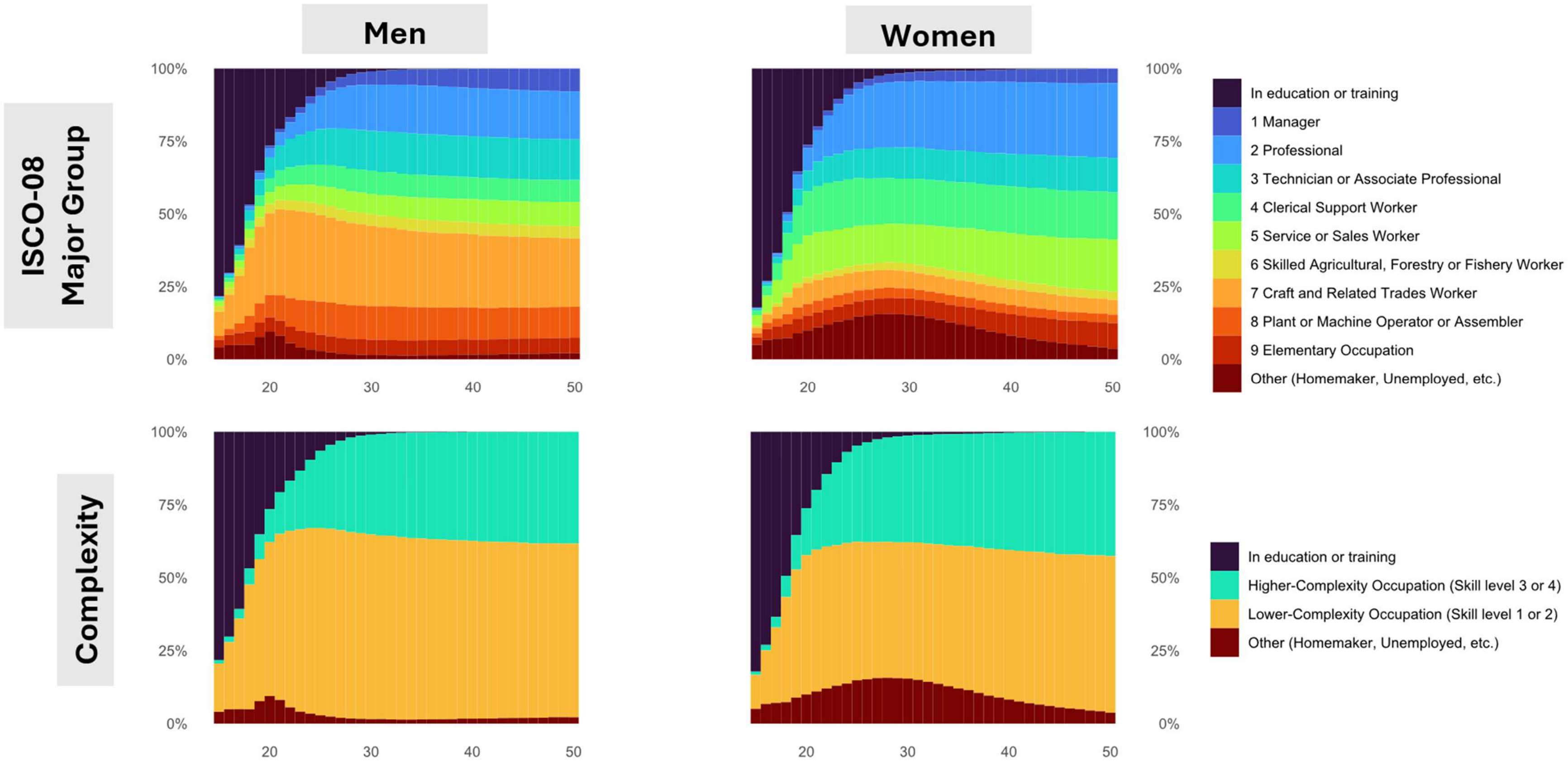
For individuals classified under the category Armed Forces Occupations, SHARE only reports the broad major group rather than the detailed subgroup. Because the subgroups within this category vary in assigned skill level, occupational complexity could not be reliably determined. Therefore, individuals with employment spells in this category were excluded from the analytic sample (7 women and 9 men).

Table B1 provides an overview of all ISCO-08 major occupational groups, including their descriptions and corresponding skill levels. Figures B1-2 in Appendix B present the distribution of individuals across occupational categories at each age from 15 to 50 in the samples and within the employment history clusters.

Table B1 Major ISCO-08 Occupational Groups: Definitions and Corresponding Skill Levels

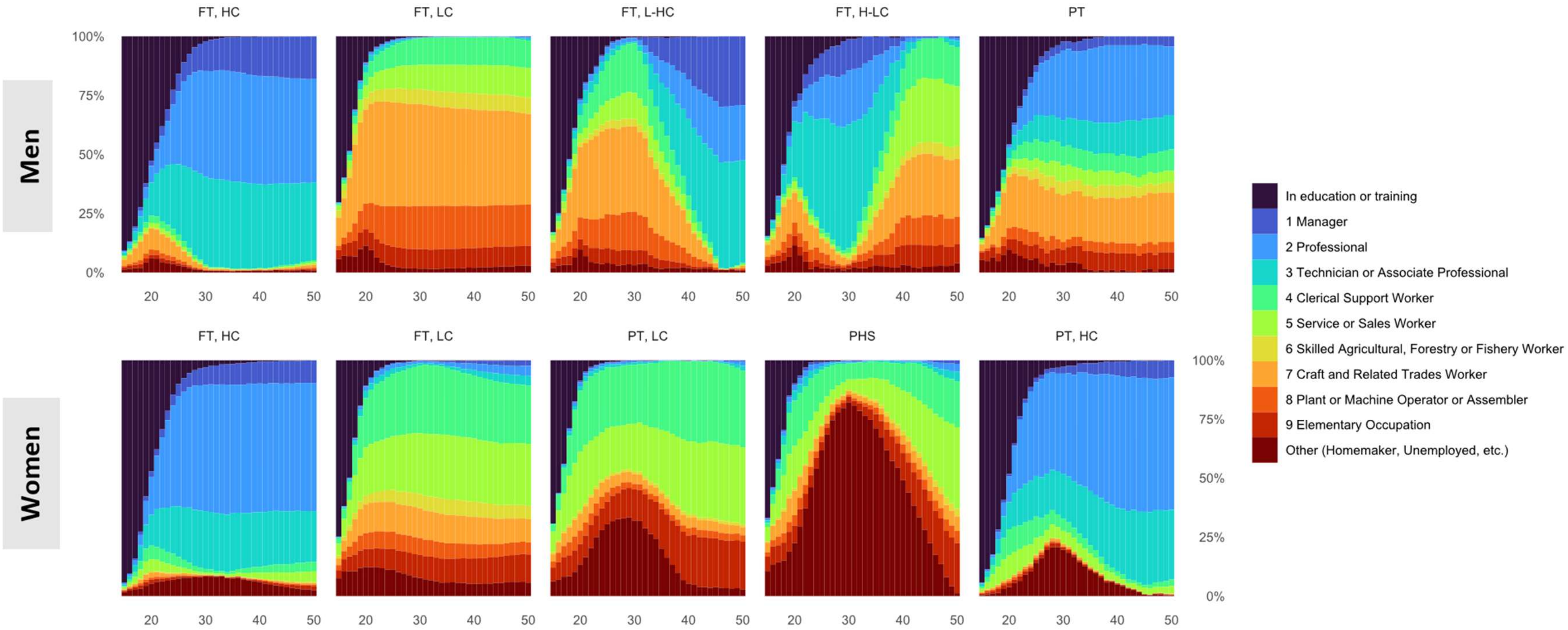
Major ISCO-08 groups	Definition	Skill level
Managers	"Managers plan, direct, coordinate and evaluate the overall activities of enterprises, governments and other organizations, or of organizational units within them, and formulate and review their policies, laws, rules and regulations." (International Labour Office, 2012, p. 87)	3 and 4
Professionals	"Professionals increase the existing stock of knowledge; apply scientific or artistic concepts and theories; teach about the foregoing in a systematic manner; or engage in any combination of these activities." (International Labour Office, 2012, p. 109)	4
Technicians and Associate Professionals	"Technicians and associate professionals perform technical and related tasks connected with research and the application of scientific or artistic concepts and operational methods, and government or business regulations." (International Labour Office, 2012, p. 169)	3
Clerical Support Workers	"Clerical support workers record, organise, store, compute and retrieve information, and perform a number of clerical duties in connection with money-handling operations, travel arrangements, requests for information, and appointments." (International Labour Office, 2012, p. 219)	2
Services and Sales Workers	"Services and sales workers provide personal and protective services related to travel, housekeeping, catering, personal care, or protection against fire and unlawful acts, or demonstrate and sell goods in wholesale or retail shops and similar establishments, as well as at stalls and on markets." (International Labour Office, 2012, p. 235)	2
Skilled Agricultural, Forestry and Fishery Workers	"Skilled agricultural, forestry and fishery workers grow and harvest field or tree and shrub crops, gather wild fruits and plants, breed, tend or hunt animals, produce a variety of animal husbandry products; cultivate, conserve and exploit forests; breed or catch fish; and cultivate or gather other forms of aquatic life in order to provide food, shelter and income for themselves and their households." (International Labour Office, 2012, p. 261)	2
Craft and Related Trades Workers	"Craft and related trades workers apply specific technical and practical knowledge and skills in the fields to construct and maintain buildings; form metal; erect metal structures; set machine tools or make, fit, maintain and repair machinery, equipment or tools; carry out printing work; and produce or process foodstuffs, textiles and wooden, metal and other articles, including handicraft goods." (International Labour Office, 2012, p. 277)	2
Plant and Machine Operators and Assemblers	"Plant and machine operators and assemblers operate and monitor industrial and agricultural machinery and equipment on the spot or by remote control; drive and operate trains, motor vehicles and mobile machinery and equipment; or assemble products from component parts according to strict specifications and procedures." (International Labour Office, 2012, p. 313)	2
Elementary Occupations	"Elementary occupations involve the performance of simple and routine tasks which may require the use of hand-held tools and considerable physical effort." (International Labour Office, 2012, p. 337)	1
Armed Forces Occupations	"Armed forces occupations include all jobs held by members of the armed forces. Members of the armed forces are those personnel who are currently serving in the armed forces, including auxiliary services, whether on a voluntary or compulsory basis, and who are not free to accept civilian employment and are subject to military discipline. Included are regular members of the army, navy, air force and other military services, as well as conscripts enrolled for military training or other service for a specified period." (International Labour Office, 2012, p.357)	1,2, and 4

Figure B1 Distribution of Occupational Group and Job Complexity Across Ages 15 to 50 for Men and Women



Note. Each stacked bar represents the occupation group of individuals at a given age, displayed separately for men (left panels) and women (right panels). The top row shows proportions by ISCO-08 major occupational group, including education or training and other non-employment. The bottom row displays aggregated occupational complexity levels (higher-complexity occupations, lower-complexity occupations). Percentage values on the y-axis indicate the relative share of individuals in each category at each age point. Colours correspond to legend categories shown on the right.

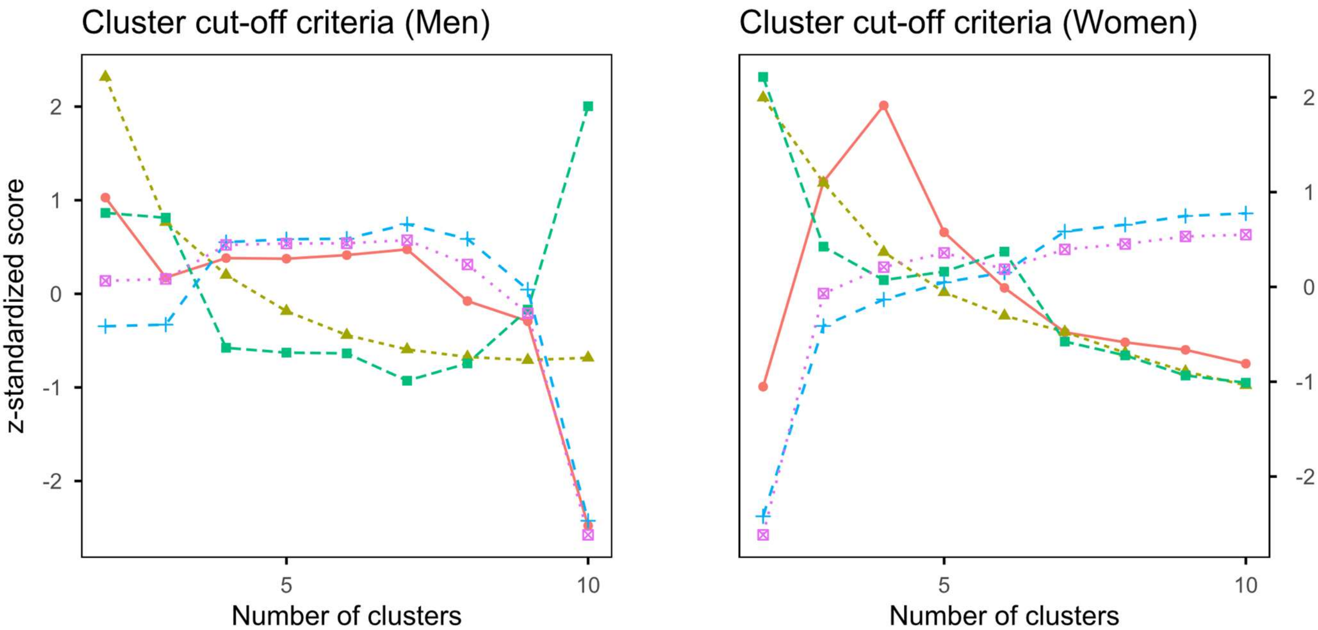
Figure B2 Distribution of Occupational Group and Job Complexity Across Ages 15 to 50 for Men and Women by Employment History Cluster



Note. Each stacked bar represents the occupation group of individuals at a given age, displayed separately for men (upper panels) and women (lower panels). The top row shows proportions by ISCO-08 major occupational group, including education or training and other non-employment. The bottom row displays aggregated occupational complexity levels (higher-complexity occupations, lower-complexity occupations). Percentage values on the y-axis indicate the relative share of individuals in each category at each age point. Colours correspond to legend categories shown on the right. Abbreviations: **FT, HC** = Full-Time, Higher Complexity; **FT, LC** = Full-Time, Lower Complexity; **FT, H-LC** = Full-Time, Higher to Lower Complexity; **FT, L-HC** = Full-Time, Lower to Higher Complexity; **PT** = Part-Time; **PT, HC** = Part-Time, Higher Complexity; **PT, LC** = Part-Time, Lower Complexity; **PHS** = Prolonged Homemaking Spell.

C Sequence Analysis

Figure C1 Z-standardized cutoff criteria for all clustering solutions from k = 2 to k =10 for the samples of men and women



Note: Lines depict z-standardized scores of five clustering indices for solutions with varying numbers of clusters, estimated separately for men (left panel) and women (right panel). The x-axis represents the candidate number of clusters, and the y-axis represents the corresponding z-standardized index values. ASW – Average Silhouette Width, CH – Calinski-Harabasz Index, HC – Hubert's C Index, HGSD – Hubert's Gamma Statistic, and PBC – Point Biserial Correlation.

D Identifying Assumptions

Table D1 First-Stage Regression Table and Kleibergen-Paap Wald RK F Statistics for Instrument Strength (Men)

Men	Model 1 ($\mathrm{RET_t}$)	Model 2 ($\mathrm{RET_{t-1}}$)	Model 3 ($\mathrm{DUR_t}$)
Regression Coefficients			
FT, HC (*Ref.*)	**0.228****** **(0.010)**	**0.205****** **(0.010)**	**0.668****** **(0.015)**
FT, LC	**-0.035**** **(0.011)**	**-0.024*** **(0.011)**	**0.153****** **(0.017)**
FT, H-LC	**0.086*** **(0.034)**	**0.104**** **(0.035)**	**0.115** **(0.089)**
FT, L-HC	**-0.002** **(0.024)**	**0.007** **(0.023)**	**0.000** **(0.044)**
PT	**0.079.** **(0.041)**	**0.091*** **(0.042)**	**0.059** **(0.091)**
Kleibergen-Paap Wald rk F-Statistics			
FT, HC (*Ref.*)	**194.6**	**166.4**	**978.6**
FT, LC	**1,035.3**	**1,151.7**	**2,571.0**
FT, H-LC	**111.1**	**129.5**	**158.4**
FT, L-HC	**69.6**	**68.3**	**45.1**
PT	**53.3**	**56.2**	**37.3**
Observations	**49,174**	**49,174**	**49,174**
Individuals	**13,823**	**13,823**	**13,823**

Note: This table presents first-stage regression results from the FE-TSLS estimation for men, controlling for age squared, Learning, and individual- and interview year-fixed effects. The upper rows show the regression coefficients, where FT, HC is the reference cluster. The lower rows report Kleibergen-Paap Wald rk F-statistics, which test for weak identification accounting for clustering at the individual level. All F-statistics exceed 10, indicating strong instruments for all cluster-specific effects. Standard errors (in parentheses) are clustered at the individual level. Significance levels: . p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001. Abbreviations: **FT, HC** = Full-Time, Higher Complexity; **FT, LC** = Full-Time, Lower Complexity; **FT, H-LC** = Full-Time, Higher to Lower Complexity; **FT, L-HC** = Full-Time, Lower to Higher Complexity; **PT** = Part-Time; **PT, HC** = Part-Time, Higher Complexity; **PT, LC** = Part-Time, Lower Complexity; **PHS** = Prolonged Homemaking Spell.

Table D2 First-Stage Regression Table and Kleibergen-Paap Wald RK F Statistics for Instrument Strength (Women)

Women	**Model 1 ($\mathbf{RET_t}$)**	**Model 2 ($\mathbf{RET_{t-1}}$)**	**Model 3 ($\mathbf{DUR_t}$)**
Regression Coefficients			
FT, HC (*Ref.*)	**0.273*** (0.011)**	**0.227*** (0.011)**	**0.692*** (0.015)**
FT, LC	**-0.032* (0.014)**	**-0.002 (0.014)**	**0.141*** (0.018)**
PT, HC	**0.058** (0.022)**	**0.097*** (0.022)**	**0.023 (0.031)**
PT, LC	**0.063** (0.020)**	**0.107*** (0.020)**	**0.121*** (0.030)**
PHS	**0.081** (0.025)**	**0.124*** (0.025)**	**0.068. (0.036)**
Kleibergen-Paap Wald rk F-Statistics			
FT, HC (*Ref.*)	**281.3**	**238.2**	**1,181.3**
FT, LC	**624.1**	**658.0**	**2,331.5**
PT, HC	**253.2**	**282.6**	**434.4**
PT, LC	**159.1**	**164.3**	**232.4**
PHS	**210.0**	**220.5**	**356.9**
Observations	**43,961**	**43,961**	**43,961**
Individuals	**12,053**	**12,053**	**12,053**

Note: This table presents first-stage regression results from the FE-TSLS estimation for women, controlling for age squared, Learning, and individual- and interview year-fixed effects. The upper rows show the regression coefficients, where FT, HC is the reference cluster. The lower rows report Kleibergen-Paap Wald rk F-statistics, which test for weak identification accounting for clustering at the individual level. All F-statistics exceed 10, indicating strong instruments for all cluster-specific effects. Standard errors (in parentheses) are clustered at the individual level. Significance levels: . p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001. Abbreviations: **FT, HC** = Full-Time, Higher Complexity; **FT, LC** = Full-Time, Lower Complexity; **FT, H-LC** = Full-Time, Higher to Lower Complexity; **FT, L-HC** = Full-Time, Lower to Higher Complexity; **PT** = Part-Time; **PT, HC** = Part-Time, Higher Complexity; **PT, LC** = Part-Time, Lower Complexity; **PHS** = Prolonged Homemaking Spell.

E Robustness Checks

E.1 Excluding Cohabitating Couples

Table E1 Cluster-Specific Local Average Treatment Effects on Episodic Memory, and Differences Relative to the Reference Cluster After the Exclusion of Cohabitating Couples from the Sample

		Model 1 (RET_t)		Model 2 (RET_{t-1})		Model 3 (DUR_t)	
Cluster		**LATE**	**Interaction (Ref.: FT, HC)**	**LATE**	**Interaction (Ref.: FT, HC)**	**LATE**	**Interaction (Ref.: FT, HC)**
Men							
FT,	HC	**-0.245**	**Ref.**	**-0.317**	**Ref.**	**-0.089*****	**Ref.**
		(.222)		**(0.238)**		**(0.021)**	
FT,	LC	**-0.529***	**-0.284.**	**-0.630***	**-0.313***	**-0.094*****	**-0.005**
		(0.236)	**(0.150)**	**(0.246)**	**(0.148)**	**(0.018)**	**(0.015)**
FT,	H-LC	**-0.860***	**-0.615.**	**-0.843***	**-0.526**	**-0.132****	**-0.043**
		(0.358)	**(0.340)**	**(0.408)**	**(0.385)**	**(0.047)**	**(0.046)**
FT,	L-HC	**-0.755***	**-0.510.**	**-0.688***	**-0.371**	**-0.145*****	**-0.056.**
		(0.324)	**(0.281)**	**(0.326)**	**(0.275)**	**(0.033)**	**(0.032)**
PT		**0.878***	**1.124****	**1.016***	**1.333****	**0.023**	**0.112***
		(0.423)	**(0.402)**	**(0.462)**	**(0.434)**	**(0.056)**	**(0.055)**
Adjusted R^2			**0.485**		**0.485**		**0.485**
Min KP F			**53.5**		**56.2**		**37.3**
Observations			**49,144**		**49,144**		**49,144**
Women							
FT,	HC	**0.395***	**Ref.**	**0.017**	**Ref.**	**-0.049***	**Ref.**
		(0.199)		**(0.232)**		**(0.021)**	
FT,	LC	**0.241**	**-0.154**	**-0.293**	**-0.310.**	**-0.078*****	**-0.029.**
		(0.212)	**(0.172)**	**(0.227)**	**(0.179)**	**(0.018)**	**(0.017)**
PT,	HC	**0.179**	**-0.217**	**-0.391**	**-0.408**	**-0.087****	**-0.038**
		(0.248)	**(0.237)**	**(0.260)**	**(0.248)**	**(0.033)**	**(0.031)**
PT,	LC	**-0.043**	**-0.438.**	**-0.370**	**-0.387.**	**-0.080****	**-0.031**
		(0.245)	**(0.231)**	**(0.242)**	**(0.232)**	**(0.027)**	**(0.026)**
PHS		**0.229**	**-0.167**	**-0.210**	**-0.227**	**-0.068***	**-0.020**
		(0.267)	**(0.263)**	**(0.262)**	**(0.264)**	**(0.030)**	**(0.030)**
Adjusted R^2			**0.505**		**0.505**		**0.505**
Min KP F			**159.1**		**164.3**		**232.4**
Observations			**43,956**		**43,956**		**43,956**

Note: Cluster-specific LATEs from the three main models for men and women, excluding cohabitating couples. For each cluster, the LATE equals the main effect plus the cluster interaction term and is tested against zero using Wald tests based on the clustered variance-covariance matrix. The column *Interaction (Ref.: FT, HC)* reports the interaction coefficient only, which tests whether the retirement effect in that cluster differs from the effect in the reference cluster. Standard errors are clustered at the individual level. Significance levels: . p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001. Abbreviations: **FT, HC** = Full-Time, Higher Complexity; **FT, LC** = Full-Time, Lower Complexity; **FT, H-LC** = Full-Time, Higher to Lower Complexity; **FT, L-HC** = Full-Time, Lower to Higher Complexity; **PT** = Part-Time; **PT, HC** = Part-Time, Higher Complexity; **PT, LC** = Part-Time, Lower Complexity; **PHS** = Prolonged Homemaking Spell.

E.2 Immediate and Delayed Recall

Table E2 Cluster-Specific Local Average Treatment Effects on the Immediate Recall Test Score, and Differences Relative to the Reference Cluster

Cluster		Model 1 (RET_t) LATE	Model 1 (RET_t) Interaction (Ref.: FT, HC)	Model 2 (RET_{t-1}) LATE	Model 2 (RET_{t-1}) Interaction (Ref.: FT, HC)	Model 3 (DUR_t) LATE	Model 3 (DUR_t) Interaction (Ref.: FT, HC)
Men							
FT,	HC	-0.241*	Ref.	-0.311*	Ref.	-0.050***	Ref.
		(0.116)		(0.125)		(0.011)	
FT,	LC	-0.297*	-0.056	-0.362**	-0.051	-0.043***	0.007
		(0.124)	(0.078)	(0.130)	(0.077)	(0.009)	(0.008)
FT,	H-LC	-0.627***	-0.386*	-0.682**	-0.371.	-0.082**	-0.032
		(0.188)	(0.179)	(0.213)	(0.200)	(0.027)	(0.027)
FT,	L-HC	-0.530**	-0.289.	-0.509**	-0.198	-0.087***	-0.037*
		(0.174)	(0.150)	(0.178)	(0.149)	(0.018)	(0.017)
PT		0.232	0.473*	0.340	0.651**	-0.034	0.016
		(0.241)	(0.231)	(0.265)	(0.252)	(0.035)	(0.034)
Adjusted R^2			0.407		0.407		0.407
Min KP F			53.5		56.2		37.3
Observations			49,144		49,144		49,144
Women							
FT,	HC	0.097	Ref.	-0.081	Ref.	-0.018.	Ref.
		(0.102)		(0.119)		(0.010)	
FT,	LC	0.046	-0.051	-0.189	-0.107	-0.029**	-0.011
		(0.108)	(0.087)	(0.115)	(0.091)	(0.009)	(0.009)
PT,	HC	-0.093	-0.191	-0.387**	-0.306*	-0.047**	-0.029.
		(0.123)	(0.118)	(0.135)	(0.129)	(0.018)	(0.017)
PT,	LC	-0.032	-0.129	-0.140	-0.059	-0.024.	-0.006
		(0.123)	(0.116)	(0.126)	(0.121)	(0.014)	(0.014)
PHS		0.082	-0.015	-0.107	-0.025	-0.017	0.001
		(0.135)	(0.133)	(0.130)	(0.131)	(0.015)	(0.015)
Adjusted R^2			0.410		0.410		0.410
Min KP F			159.1		164.3		232.4
Observations			43,956		43,956		43,956

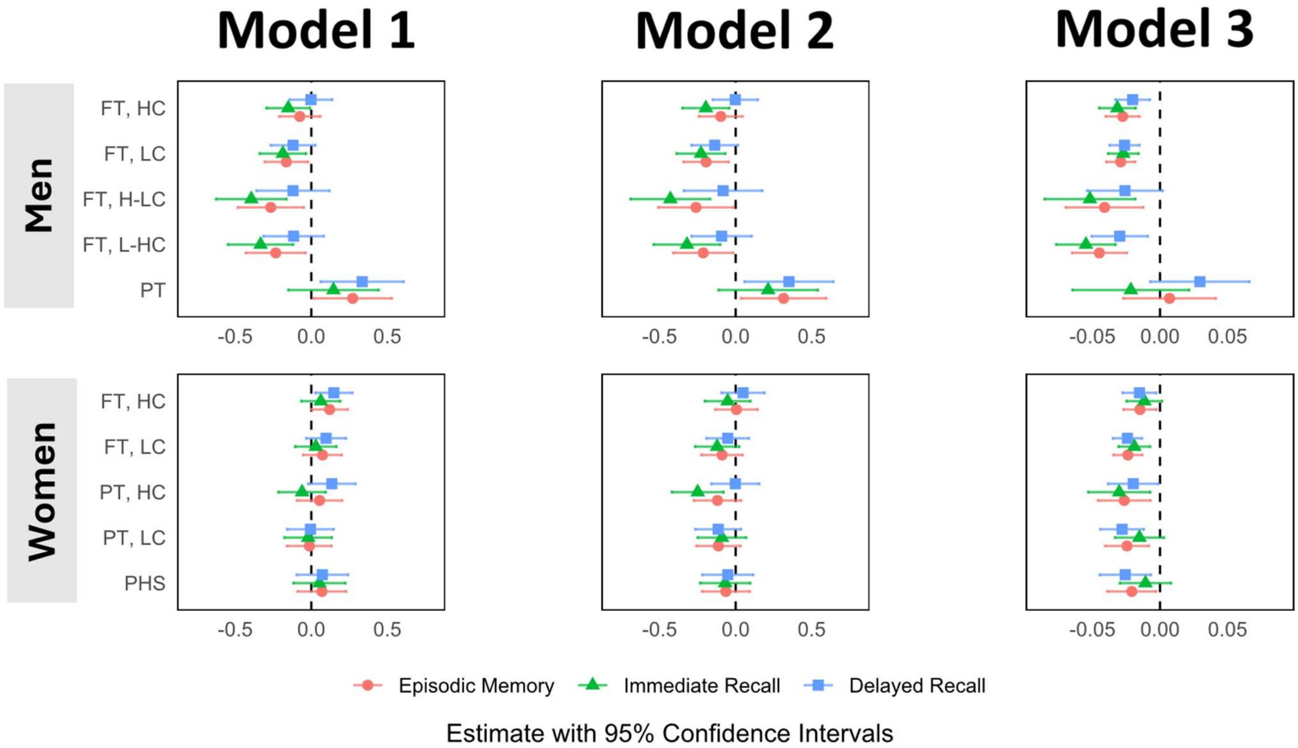
Note: Cluster-specific LATEs from the three main models for men and women, with the immediate recall test score as the outcome. For each cluster, the LATE equals the main effect plus the cluster interaction term and is tested against zero using Wald tests based on the clustered variance-covariance matrix. The column Interaction (Ref.: FT, HC) reports the interaction coefficient only, which tests whether the retirement effect in that cluster differs from the effect in the reference cluster. Standard errors are clustered at the individual level. Significance levels: . p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001. Abbreviations: **FT, HC** = Full-Time, Higher Complexity; **FT, LC** = Full-Time, Lower Complexity; **FT, H-LC** = Full-Time, Higher to Lower Complexity; **FT, L-HC** = Full-Time, Lower to Higher Complexity; **PT** = Part-Time; **PT, HC** = Part-Time, Higher Complexity; **PT, LC** = Part-Time, Lower Complexity; **PHS** = Prolonged Homemaking Spell.

Table E3 Cluster-Specific Local Average Treatment Effects on the Delayed Recall Test Score, and Differences Relative to the Reference Cluster

		Model 1 (RET_t)		Model 2 (RET_{t-1})		Model 3 (DUR_t)	
Cluster		**LATE**	**Interaction (Ref.: FT, HC)**	**LATE**	**Interaction (Ref.: FT, HC)**	**LATE**	**Interaction (Ref.: FT, HC)**
Men							
FT,	HC	**-0.004**	**Ref.**	**-0.004**	**Ref.**	**-0.039****	**Ref.**
		(0.138)		**(0.146)**		**(0.013)**	
FT,	LC	**-0.232**	**-0.228***	**-0.266.**	**-0.261****	**-0.051*****	**-0.012**
		(0.145)	**(0.093)**	**(0.151)**	**(0.092)**	**(0.011)**	**(0.009)**
FT,	H-LC	**-0.233**	**-0.229**	**-0.160**	**-0.155**	**-0.050.**	**-0.011**
		(.237)	**(0.225)**	**(0.255)**	**(0.241)**	**(0.028)**	**(0.027)**
FT,	L-HC	**-0.225**	**-0.221**	**-0.178**	**-0.174**	**-0.058****	**-0.019**
		(0.196)	**(0.170)**	**(0.196)**	**(0.165)**	**(0.020)**	**(0.019)**
PT		**0.647***	**0.651***	**0.678***	**0.682***	**0.057**	**0.096****
		(0.270)	**(0.256)**	**(0.288)**	**(0.271)**	**(0.036)**	**(0.035)**
Adjusted R^2			**0.454**		**0.454**		**0.454**
Min KP F			**53.5**		**56.2**		**37.3**
Observations			**49,144**		**49,144**		**49,144**
Women							
FT,	HC	**0.298***	**Ref.**	**0.098**	**Ref.**	**-0.031***	**Ref.**
		(0.126)		**(0.146)**		**(0.013)**	
FT,	LC	**0.195**	**-0.103**	**-0.105**	**-0.202.**	**-0.048*****	**-0.018.**
		(0.134)	**(0.107)**	**(0.144)**	**(0.112)**	**(0.011)**	**(0.011)**
PT,	HC	**0.272.**	**-0.026**	**-0.004**	**-0.102**	**-0.040***	**-0.009**
		(0.159)	**(0.150)**	**(0.161)**	**(0.154)**	**(0.019)**	**(0.018)**
PT,	LC	**-0.011**	**-0.309***	**-0.231**	**-0.328***	**-0.056*****	**-0.026**
		(0.157)	**(0.147)**	**(0.154)**	**(0.147)**	**(0.017)**	**(0.016)**
PHS		**0.146**	**-0.152**	**-0.104**	**-0.202**	**-0.052****	**-0.021**
		(0.174)	**(0.170)**	**(0.172)**	**(0.171)**	**(0.019)**	**(0.019)**
Adjusted R^2			**0.481**		**0.481**		**0.481**
Min KP F			**159.1**		**164.3**		**232.4**
Observations			**43,956**		**43,956**		**43,956**

Note: Cluster-specific LATEs from the three main models for men and women, with the delayed recall test score as the outcome. For each cluster, the LATE equals the main effect plus the cluster interaction term and is tested against zero using Wald tests based on the clustered variance-covariance matrix. The column Interaction (Ref.: FT, HC) reports the interaction coefficient only, which tests whether the retirement effect in that cluster differs from the effect in the reference cluster. Standard errors are clustered at the individual level. Significance levels: . p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001. Abbreviations: **FT, HC** = Full-Time, Higher Complexity; **FT, LC** = Full-Time, Lower Complexity; **FT, H-LC** = Full-Time, Higher to Lower Complexity; **FT, L-HC** = Full-Time, Lower to Higher Complexity; **PT** = Part-Time; **PT, HC** = Part-Time, Higher Complexity; **PT, LC** = Part-Time, Lower Complexity; **PHS** = Prolonged Homemaking Spell.

Figure E1 Cluster-Specific Local Average Treatment Effects with 95-Percent Confidence Intervals for Men and Women with Z-Standardized Episodic Memory, Immediate Recall, and Delayed Recall Test Scores as Outcomes



Note. The upper panels show the LATE estimates for men, the lower panels the estimates for women, by employment history cluster for episodic memory and its components immediate recall and delayed recall. The scores are z-standardized for better comparability (effect size in standard deviations). The first, second, and third column of panels represent main models **Model 1** (retirement), **Model 2** (retirement after one year), and **Model 3** (retirement duration), respectively. Abbreviations: **FT, HC** = Full-Time, Higher Complexity; **FT, LC** = Full-Time, Lower Complexity; **FT, H-LC** = Full-Time, Higher to Lower Complexity; **FT, L-HC** = Full-Time, Lower to Higher Complexity; **PT** = Part-Time; **PT, HC** = Part-Time, Higher Complexity; **PT, LC** = Part-Time, Lower Complexity; **PHS** = Prolonged Homemaking Spell.