



Staying sharp: gendered work–family life courses and later-life cognitive functioning across four European welfare states

Giulia Tattarini^{*,1} , Damiano Uccheddu² , Ariane Bertogg³ 

¹Department of Socioeconomics, Faculty of Business, Economics and Social Sciences, University of Hamburg, Hamburg, Germany

²Center for Demographic Research (DEMO), University of Louvain (UCLouvain), Ottignies-Louvain-la-Neuve, Belgium

³Department of History, Sociology, Sport Science and Empirical Educational Research, University of Konstanz, Konstanz, Germany

*Corresponding author: Giulia Tattarini, Department of Socioeconomics, Faculty of Business, Economics and Social Sciences, University of Hamburg, Welckerstraße 8, 20354 Hamburg (giulia.tattarini@uni-hamburg.de)

Abstract

Cognitive functioning in later life is influenced by reserves accumulated through employment and family roles over the life course. This study examined men's and women's combined employment, parenthood, and partnership roles between ages 15 and 49 years, and their associations with later-life memory. We used retrospective and prospective data from nine waves of the Survey of Health, Aging and Retirement in Europe (SHARE) for 5638 men (24 199 observations) and 6371 women (27 114 observations) in Italy, France, the Netherlands, and Sweden. Multichannel sequence analysis (MCSQA) and hierarchical clustering identified six work–family life course types for men and nine for women. Random-effects linear regression models indicate that weak labor market attachment is associated with lower memory performance among women, whereas the absence of family roles is more strongly negatively associated with memory among men. Women's cognitive gaps were most pronounced in Italy and least in Sweden and the Netherlands, while men's gaps were greater in Sweden and France. These findings suggest that gendered life courses contribute to different patterns of cognitive and relational reserve accumulation for men and women, and that welfare states buffer the negative consequences of adverse life courses on cognitive health.

This article is part of a Special Collection on Cross-National Gerontology.

Key words: cognitive health; work–family trajectories; gender; welfare state; longitudinal study.

Introduction

Cognitive decline, beginning in midlife, involves gradual memory loss and increases the risk of functional dependence¹ and dementia.² Dementia-related conditions are among the most common causes of mortality, accounting for 9% of deaths worldwide,³ with global healthcare costs estimated at US \$1.3 trillion in 2019.⁴

Slowing cognitive decline is a critical public health and research priority. Early- and midlife factors have been linked to cognitive disability and dementia risk,⁵ including both employment^{6–9} and family roles.^{10,11} However, the joint role of work and family remains understudied.^{12,13} Ice and colleagues¹⁴ provided a foundational study of their combined impact on later-life cognitive health. Their results show that full-time employment benefits women's cognitive health, although partnered mothers in part-time work fare even better. Similar findings from the US link paid work after childbearing to slower women's memory decline¹⁵ while evidence from China suggests later-life cognition is highest among those with stable marriages, two or more children, and steady midlife employment,¹⁶ although pooled analyses of men and women preclude gender-specific conclusions. While this evidence highlights mid-life work and family as key predictors

of cognitive health, research gaps relate to gender differences and differences between welfare state contexts.

To address these gaps, we investigated how employment and family trajectories jointly predict later-life memory. Following the concept of reserves' accumulation,^{17,18} we argued that resources from mid-life employment and family roles accumulate and interact to shape cognitive outcomes in later life. In doing so, our study makes different contributions to the literature. Firstly, we leveraged recent SHARE data (2004–2022) to capture greater variability in cognitive health across eight-panel waves, and among cohorts born between 1910 and 1967, who were exposed to major 20th century social shifts.

Secondly, unlike prior studies focusing mainly on women,^{14,15} we adopted a gender-sensitive perspective that acknowledges gender-specific patterns of reserve accumulation and vulnerability.^{19,20} Research on the health consequences of combining work and family roles has often excluded men,²⁰ under the (possibly flawed) assumption that this is less relevant, given their traditional non-caregiver role in families.²¹ However, younger male cohorts are increasingly involved in family responsibilities and childcare,²² while facing greater employment and marital

Received: July 24, 2024. Accepted: July 30, 2025

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instability.^{19,23,24} Multiple sex-specific pathways have linked life courses to gender-specific long-term health outcomes.^{21,25–27} A gender-sensitive approach can clarify how distinct work and family factors influence cognitive health in later life.

Thirdly, whereas previous studies typically focus on single-country analyses^{15,16,28} or pooled European samples,^{14,29} we examined how institutional factors moderate these relationships by comparing four theoretically selected countries representing contrasting work–family³⁰ and welfare state regimes.³¹ These contrasting country cases, representing different “risk management systems,”³² enable analysis of multidimensional institutional processes of reserve accumulation and reveal potential macro-level differences contributing to cognitive heterogeneity in later life.³³

The concept of “reserves” refers to accumulated protective factors for cognitive health across the lifespan.¹⁷ Reserves are latent capacities built, accumulated, and used in older age to delay cognitive decline.^{17,18} As modifiable risk factors, they explain the heterogeneity in the correlation between cognitive symptoms and brain health.^{17,18} For this study, two types of reserves are relevant. First, *cognitive reserves* arise from cognitively stimulating activities, such as education or employment^{34,35} or (grand)parenting.^{29,36,37} Notably, mid-life work inactivity, such as unemployment, reduces cognitive reserves but is mitigated if accompanied by defined, purposeful activities like childrearing.²⁹

Second, *relational reserves* are social capital expansions arising from family roles across the life course.¹⁷ Individuals acquire significant others, and role sets through marriage and parenthood, while union dissolution negatively affects relational reserves. Support from spouses and children protects against dementia, loneliness, and depression^{38,39} and promotes cognitive functioning.^{36,40} Relational reserves also arise from labor market participation. “Weak ties” with colleagues and other non-kin help alleviate job-related stress⁴¹ and promote cognitive health.⁴² Thus, both work and family domains contribute to accumulating cognitive and relational reserves, protecting cognitive health later in life.^{14,29} However, adversity in family and work, including childlessness, singlehood, divorce, unemployment, or discontinued employment, produces generalized stress,^{28,43} which is negatively related to cognitive health.⁴⁴

We define “integrated” life courses as combining continuous full-time employment with family roles—specifically, long-term partnership and parenthood—over the life course. The term is not intended to carry normative weight but describe the co-occurrence and continuity of two core life domains and social roles—worker and family member—traditionally considered central markers of adulthood and social integration. Conversely, in “non-integrated” life courses such double integration is fragmented or absent, resulting from either limited family roles (eg, singlehood or childlessness) or marginal attachment to employment. We adopt a role accumulation perspective, positing that individuals with “integrated” life courses are more likely to develop and preserve cognitive reserves. Conversely, “non-integrated” life courses may hinder this process through distinct mechanisms, ultimately leading to lower cognitive functioning in later life.

Work–family biographies differ between men and women.^{45,46} Men typically followed continuous full-time employment trajectories, with variation in the timing and likelihood of partnership and fatherhood. Male “non-integrated” trajectories include employment instability, part-time employment, singlehood, or childlessness, diverging from the “standard” male breadwinner model.⁴⁷ Women’s trajectories range from continuous full-time employment to permanent labor market dropout after child-

birth,²⁶ reflecting a pattern commonly shared across cohorts and countries and shaped by normative expectations.^{47–49} For women, certain “non-integrated” histories may accommodate employment and unpaid family work through part-time employment or career breaks around childbirth.^{28,50}

Gender differences in exposure to employment and family roles likely lead to differential cognitive benefits. Although women’s health is less affected by short-term job loss than men’s⁵¹, women typically spend longer periods away from paid employment in mid-adulthood, limiting the accumulation of cognitive and relational reserves. For instance, women’s average labor market absence (due to childrearing) exceeds men’s (due to unemployment; descriptive accounts provided elsewhere⁵²). As the forgone opportunity to accumulate reserves during non-work periods is likely greater for women than for men, we hypothesize that *non-integrated work–family life courses characterized by the complete absence of work roles but with family roles should be more strongly associated with lower memory for women than for men* (Hypothesis H1a—exposure to work).

However, for men too, the absence of stable work roles in adulthood poses a risk to cognitive health. Unemployment and nonstandard employment conflict with normative male breadwinner expectations⁴⁶ and may entail mental health risks, stigma, and social isolation and exclusion. Empirically, unemployment⁵¹ and weak labor attachment^{28,53} in men are linked to lower health and well-being. Therefore, *non-integrated work–family life courses characterized by weak labor market attachment or absence of work, but presence of family roles are expected to be more strongly associated with lower memory in men than in women* (Hypothesis H1b—deviation from normative expectations).

Most female life courses combine family roles with variations in employment. A nuanced perspective considering timing, sequencing, and partial overlap of women’s (partial) employment participation is necessary. Moreover, different reserves may accumulate, or compensate each other, across domains,⁵⁴ with gendered consequences.^{21,55} For instance, reconciling full-time work and family responsibilities may be more demanding for women, and its cognitive benefits may be offset by the associated stress. Indeed, evidence suggests greater health benefits among women and mothers from non-standard employment careers, than from integrated life. In contrast, for men with family responsibilities, continuous full-time employment remains more beneficial to health.^{28,29,50,53} Therefore, we hypothesize that *mothers with part-time employment histories exhibit better memory than both non-working and full-time working mothers* (Hypothesis H2—reconciliation advantage).

Finally, we expect gendered benefits from family roles. Women maintain consistent social ties and diversified support networks over the life course,⁵⁶ making their relational reserve less dependent on partners and children. Men, by contrast, tend to benefit more from family ties and face greater risks to well-being,⁵⁷ physical health²¹ and health behaviors⁵⁸—crucial predictors of cognitive health⁵⁹—when these are absent. Therefore, we hypothesize that *non-integrated work–family life courses characterized by absence of family roles, but presence of continuous (full-time) employment are associated with lower memory in men than in women* (Hypothesis H3—centrality of family roles).

Disparities in later-life cognitive functioning in general³³ and by gender⁶⁰ vary across Europe, reflecting differences in welfare regimes.⁶¹ Yet the role of the welfare state in shaping cognitive health remains theoretically unclear. We argue that welfare states moderate the role of work–family life courses for cognitive health through models of risk management⁶² and normative

framing.⁶³ These frameworks shape both the experience of (non-)integrated work–family trajectories and gendered reserve accumulation therein.

Risk management systems include welfare states' measures of social assistance, insurance, and services to ensure continuity across the life course,³² mitigating adverse work or family trajectories through compensation strategies.⁶² For instance, universal welfare states reduce the economic consequences of unemployment or union dissolution via generous insurance schemes,⁵⁴ for example, benefitting single parents.⁶⁵ Active labor market programs promote adequate re-employment, while liberal divorce laws ease re-partnering after union dissolution,⁶⁶ preserving (cognitive and relational) reserves and material resources.

However, these systems operate within gender-based “normative modeling.”³² Depending on the culturally shaped standard model of breadwinning and caregiving, which are promoted through laws and policies,^{63,65} welfare states shape gender differences in reserve accumulation. De-familiarizing welfare states de-commodify caregiving responsibilities⁶¹ and facilitate women's economic independence by fostering their employment.⁶⁷ A dual-breadwinner model further fosters male engagement in family roles (eg, shared parenting),^{68,69} creating opportunities for relational reserve accumulation.

Our four countries—Italy, France, the Netherlands, and Sweden—represent distinct risk management models (see Appendix S1, Table S1 for a structured overview). Sweden's universal, de-familiarizing system invests in risk recovery from family and labor market adversities.^{61,70} France and the Netherlands, both conservative welfare states, rely on insurance schemes for labor-related adversity recovery, mainly protecting (male) labor market insiders.⁷⁰ Unlike the Netherlands, France's pronatalist and de-familiarizing policies equally foster parenthood and (female) employment. Empirically, women's full-time employment, liberal divorce laws, and shared parenting are most common in Sweden and France, and least in Italy. The Netherlands represents a “hybrid” case: ambiguous risk prevention and recovery policies⁶¹ follow a “familism by default” model.⁶³ Dutch women's “secondary earner role,” accommodated via part-time employment, enjoys social protection, but limited family caregiver support exists beyond. Italy's represents the “Southern model,” a sub-protective welfare state with strong gendered division of labor, offering little recovery from work and family adversities.^{61,71} Among Italian women (and mothers), labor market participation is less common: only a minority work in continuous, full-time employment throughout their lives.

While Sweden and Italy represent opposite ends on a (gendered) risk management continuum, France and the Netherlands lie in between. Building on our previous hypotheses, we expect that *non-integrated work–family life courses characterized by the absence of work roles, but the presence of family roles will be more strongly associated with lower memory for women in Italy than in Sweden (Hypothesis H4a)*. Similarly, *non-integrated work–family life courses characterized by the absence of family roles, but continuous (full-time) employment should be more strongly associated with lower memory for men in Italy than in Sweden (Hypothesis H4b)*. Finally, due to gender expectations embedded in different “normative modeling,”³² *non-integrated life courses with weak labor market attachment but family roles should be more protective for women's cognitive health in Italy than in Sweden, and the reverse should hold for men. In France and the Netherlands, risks and benefits may offset each other, resulting in smaller gender differences in memory across work–family trajectories (Hypothesis H4c)*.

Methods

Data source and analytical sample

We analyzed data from the Survey of Health, Aging and Retirement in Europe (SHARE), a longitudinal survey representative of Europeans aged 50 and older.⁷² SHARE includes eight prospective panel waves and two retrospective life history surveys (SHARELIFE). We selected respondents from France, Italy, the Netherlands, and Sweden, born between 1910 and 1967, aged 50+ at baseline, who participated in one SHARELIFE interview and at least one panel wave. We excluded those with incomplete data (6.57%), diagnosed dementia (3.23%), brain cancer (0.30%), or more than two standard deviations above the mean on the EURO-D depression scale (0.54%) due to its impact on memory. The final sample included 5638 men (24 199 observations) and 6371 women (27 105 observations), comprising 47.17% and 52.83% of the sample, respectively. Table 1 shows sample characteristics.

Measures

Dependent variable

The cognitive outcome was an additive index of short- and long-term memory,⁷³ measured with a 10-word learning list, with immediate and delayed recall ranging from 0 (no words remembered) to 10 (all words remembered), and shown to be largely independent of culture, language, and socioeconomic position.^{74,75} SHARE measures memory in each wave. The scores from both scales were combined into an index ranging from 0 to 20, with a mean of 9.22 and a standard deviation of 3.41.

Independent variables

Work–family trajectories were computed from SHARELIFE's Job Episodes Panel (JEP)⁷⁶ using annual retrospective data on employment, parenthood, and partnership from ages 15 to 49. Missing values in the JEP were interpolated from the raw dataset.⁷⁷ Each year, respondents were classified into one of six employment states: “In Education,” “Working Full-Time (FT),” “Working Part-Time (PT),” “Unemployed,” “Unpaid Domestic Work,” and “Other” (eg, disability, military service, volunteering). Family histories were classified annually into: “No children, No partner”; “No children, Partner”; “Children, No partner”; and “Children, Partner.” Unlike previous studies,^{14–16} we distinguish unemployment from other non-employment activities, given its stronger association with cognitive risks.²⁹ Moreover, we consider the presence of children without age limit. Appendix S2 in Supplementary Materials report full details on independent variables.

Control variables

The multivariable analyses adjusted for cohort (1945 and earlier; 1946–1955; 1956–1967) and country of residence. The first cohort, born before or during the Second World War (1910–1945), came of age amidst economic and political upheaval, experiencing less institutionalized and standardized employment and family patterns.^{23,78,79} In contrast, post-war Baby Boomers followed a “lock-step life course”⁸⁰ characterized by full-time education, stable employment, early marriage, and normative retirement. These trajectories reflected a male breadwinner and female homemaker model, significantly limiting women's socio-economic development. We further distinguish “early” from “later” baby boomers: Women born 1946–1955 entered adulthood under more conservative gender expectations, while those born 1956–1964 came of age amid loosening norms shaped by the women's movement

Table 1. Descriptive characteristics of the study sample (N = 51 313).

	Women					Men				
	Freq.	Percent (Mean)	SD	Min	Max	Freq.	Percent (Mean)	SD	Min	Max
Cognitive outcome	27 114	(9.58)	3.52	0	20	24 199	(8.82)	3.25	0	20
Number of tests	27 114	(3.17)	1.78	1	8	24 199	(3.08)	1.76	1	8
Work-family life course										
1	6362	23.46				13 900	57.44			
2	11 187	41.26				5332	22.03			
3	1023	3.77				1452	6.00			
4	1756	6.48				677	2.80			
5	1653	6.10				1517	6.27			
6	2714	10.01				1321	5.46			
7	672	2.48								
8	1389	5.12								
9	358	1.32								
Birth cohort										
1945 and earlier	12 241	45.15				11 593	47.91			
1946-1955	10 805	39.85				9790	40.46			
1956-1967	4068	15.00				2816	11.64			
Country of residence										
Sweden	6907	25.47				7069	29.21			
Netherlands	3570	13.17				3055	12.62			
Italy	8869	32.71				7587	31.35			
France	7768	28.65				6488	26.81			
Childhood conditions										
Rooms when ten years old										
Less than 2	6216	22.93				5518	22.80			
3	7214	26.61				6394	26.42			
4	6480	23.90				5542	22.90			
5	3877	14.30				3479	14.38			
More than 6	3327	12.27				3266	13.50			
Number of books when 10										
0-10 books	10 451	40.78				9869	40.78			
11-25 books	6085	21.68				5246	21.68			
26-100 books	6630	23.72				5741	23.72			
101-200 books	2063	7.04				1704	7.04			
More than 200 books	1885	6.77				1639	6.77			
Confined to bed/home for 1 month or longer										
No	24 418	90.06				22 101	91.33			
Yes	2696	9.94				2098	8.67			
In hospital for 1 month or longer										
No	25 797	95.14				22 891	94.59			
Yes	1317	4.86				1308	5.41			
Missed school for 1 month or longer										
No	24 181	89.18				21 742	89.85			
Yes	2933	10.82				2457	10.15			
Childhood health status										
Excellent	10 140	37.4				10 075	41.63			
Very good	7291	26.89				6604	27.29			
Good	7378	27.21				5699	23.55			
Fair	1653	6.10				1391	5.75			
Poor	652	2.40				430	1.78			
Relative position to others when 10: language										
Much better	3191	11.77				1891	7.81			
Better	8022	29.59				5688	23.51			
About the same	13 352	49.24				12 598	52.06			
Worse	2189	8.07				3481	14.38			
Much worse	360	1.33				541	2.24			
Relative position to others when 10: mathematically										
Much better	2355	8.69				2938	12.14			
Better	6476	23.88				6668	27.55			
About the same	14 065	51.87				11 720	48.43			
Worse	3447	12.71				2326	9.61			
Much worse	771	2.84				547	2.26			

Unless otherwise indicated, values are reported in percentages. The life course clusters for men are named as follows: 1. "Partnered Fathers, FT Work"; 2. "Late-Partnered Fathers, FT Work"; 3. "Single Men, FT Work"; 4. "Partnered Fathers, Weak LM attachment"; 5. "Partnered Men, FT Work"; 6. "Single Fathers, FT Work". The life course clusters for women are named as follows: 1. "Partnered Mothers, Unpaid Caregiver"; 2. "Partnered Mothers, FT Work"; 3. "Partnered Mothers, Little (Un)paid Work"; 4. "Single Mothers, FT Work"; 5. "Single Women, FT Work"; 6. "Partnered Mothers, PT Work"; 7. "Partnered Mothers, Unemployed"; 8. "Partnered Women, Discontinued FT Work"; 9. "Single Mothers, PT Work". Data are from SHARE⁷² and SHARELIFE's Job Episodes Panel, release 9.0.0⁷⁶. Own estimates.

and access to contraception.⁸¹ Later Boomers, navigating adulthood in the 1980s and 1990s, faced shifting work–family arrangements^{79,82,83} and new social risks, including atypical employment and work–life conflicts.

Eight variables capture childhood conditions at age 10: general health (from “poor” to “excellent”); missing school (1 = yes), being confined to bed or home (1 = yes), and hospitalization for a minimum of 1 month (1 = yes). Cognitive ability was measured by self-reported school performance in mathematics and language relative to peers (from “Much better” to “Much worse”). The number of books (0–10; 11–25; 26–100; 101–200; 200+) and household rooms (continuous, capped at 6 by design) measured parental socioeconomic status. The number of prior cognitive assessments adjusts for “practice effects” in cognitive testing.⁸⁴ Variable coding and question wording are detailed in [Appendix S3](#) in the [Supplementary Material](#).

Methods

Sequence analysis

To identify work–family life course types, we applied multichannel sequence analysis (MCSQA),^{85,86} treating complete individual trajectories as the unit of analysis. This method simultaneously captures timing, order, and duration of events across interdependent domains of work and family. Sequence dissimilarity⁸⁷ was measured using Dynamic Hamming.^{19,88} Analyses were conducted separately by gender, pooled across countries, and implemented in R using the TraMineR package.⁸⁹ Hierarchical clustering with Ward’s linkage⁹⁰ was used to group trajectories. To identify the optimal number of clusters, we tested 2–20 solutions for men and women, assessing content validity, cross-country consistency, cluster size, and theoretical relevance. We also compared standard quality metrics and cut-off criteria in pooled and country-specific analyses, including the Average Silhouette Width and Point Biserial Correlation^{90,91} ([Appendix S1, Figures S1–S4](#)). Based on these criteria, we selected six clusters for men and nine for women ([Table 2](#) and [Appendix S1, Figures S5–S9](#)). [Tables S2](#) and [S3](#) in [Appendix S1](#) show the prevalence of work–family life course types by country and birth cohort.

Regression analysis

We estimated random intercept regression models⁹² to predict how work–family trajectories relate to memory, adjusting for control variables. All models are estimated for women and men separately ([Appendix S1, Tables S4](#) and [S5](#)). We present binary contrasts⁹³ ([Figures 1](#) and [2](#)), which compare the difference in the outcome between one category of the independent variable with the average of all other categories ([Appendix S1, Tables S6](#) and [S7](#)). Additionally, to compare all work–family life course types with each other, we used pairwise contrasts ([Appendix S1, Tables S8](#) and [S9](#)). To test whether associations vary across welfare contexts, we estimated models including interaction terms between life course types and country of residence. For ease of interpretation, contrasts of average marginal effects are presented in tables ([Appendix S1, Tables S10](#) and [S11](#)) and graphically ([Figure 3](#)). Analyses were conducted using Stata 18.5.

Robustness checks

We re-estimated the associations between work–family trajectories and different cognitive outcomes—that is, verbal fluency, numeracy, and orientation in time, alongside the original composite cognitive score^{94,95}—which remained consistent ([Appendix S1, Tables S12–S20](#)). We also re-estimated models with alternative birth cohort classifications and included interaction

terms between trajectories and cohorts. Most interactions were not statistically significant, indicating results are not driven by specific cohort groups.

Results

Work–family life courses and health

Women

[Figure 1](#) shows associations between work–family biographies and memory for women using binary contrasts (full estimates in [Appendix S1, Table S6](#)). Highest memory scores were found for integrated trajectories: “Partnered Mothers, FT Work” (Cluster 2: $b = 0.48$; $P < .001$), followed by “Single Mothers, FT Work” (Cluster 4: $b = 0.40$; $P < .01$), and “Partnered Mothers, PT Work” (Cluster 6: $b = 0.28$; $P < .01$). Lower scores appeared in “non-integrated” trajectories lacking work roles: “Partnered Mothers, Unemployed” (Cluster 7: $b = -0.76$; $P < .001$), “Partnered Mothers, Little (Un)paid Work” (Cluster 3: $b = -0.63$; $P < .001$), and “Partnered Mothers, Unpaid Caregiver” (Cluster 1: $b = -0.59$; $P < .001$), with the unemployed most disadvantaged. [Table S4](#) (Model 1) offers further insights. Partnered mothers with discontinued full-time work histories score lower than those with continuous full-time work (Cluster 8: $b = -0.48$; $P < .001$). The difference between full-time and part-time partnered mothers is small and not statistically significant (Cluster 6: $b = -0.03$; $P = .75$; [Table S4, Model 1](#)).

The absence of a partnership shows a weak association with memory among women with continuous full-time employment. As shown in [Figure 1](#), cognitive scores differ only slightly between “Partnered Mothers, FT Work” ($b = 0.48$, $P < .001$) and “Single Mothers, FT Work” ($b = 0.40$, $P < .01$). In contrast, “Single Mothers, PT Work” show the lowest score among employed women ($b = -0.76$; $P < .05$). Pairwise contrasts of predictive margins within gender ([Appendix S1, Table S8](#)) indicate that both “Single Mothers, FT Work” (difference = 0.409 ; $P < .05$) and “Partnered Mothers, FT Work” (difference = -0.322 ; $P < .05$) score higher than “Single Women, FT Work”. This suggests a cognitive advantage of motherhood, even in the absence of a partner, among women with strong labor market attachment.

Men

[Figure 2](#) shows binary contrasts for men (full estimates in [Appendix S1, Table S7](#)). Men with “integrated” work–family trajectories (“Partnered Fathers, FT Work”) exhibit the highest memory scores ($b = 0.25$; $P < .001$), while “non-integrated” trajectories lacking family roles or with weak labor market attachment show lower memory. For example, partnered fathers with weak labor market attachment (Cluster 4) have substantively lower memory scores ($b = -0.59$; $P < .01$) than their full-time employed counterparts, underscoring the crucial role of full-time work in building social and cognitive reserves.

Family roles also matter for men, as corroborated by pairwise contrasts ([Appendix S1, Table S9](#)). Among men with continuous full-time employment, the absence of a stable family life is associated with lower memory performance: “Single Fathers” (Cluster 6) have memory scores 0.27 points lower ($P < .1$) than “Partnered Fathers” with similar full-time work trajectories, though this difference is only statistically significant at the 10% level. Partnered men without children (Cluster 5) show a 0.33-point lower memory score ($P < .01$), while single men without children exhibit the largest deficit (Cluster 3; $b = -0.55$; $P < .001$), equivalent to recalling nearly half a word less on average.

These results suggest that sustained engagement in family roles, especially fatherhood, and full-time employment protects

Table 2. Description of the life course clusters (N = 51 313).

Work-family life course cluster	Average years in employment status					Average years in family status				Median age at first job	Median age at first partner	Median age at first child	
	Working Full Time (FT)	Working Part Time (PT)	Unem- ployed	Home or Family Work	In Education	Other	No children, No partner	Children, No partner	No children, Partner				Children, Partner
Women													
1	5.09	0.89	0.09	27.86	0.86	0.20	6.61	0.45	1.95	25.99	15.00	21.00	23.00
2	27.26	1.15	0.48	1.82	3.58	0.72	6.98	0.67	2.77	24.58	17.00	21.00	24.00
3	4.43	1.18	0.01	1.93	0.90	26.55	6.76	1.65	1.63	24.96	16.00	22.00	23.00
4	27.82	1.09	0.48	1.82	3.30	0.49	7.10	14.73	2.30	10.87	18.00	21.00	24.00
5	24.81	1.40	0.53	2.68	3.68	1.91	30.50	0.01	4.45	0.04	18.00	33.00	44.00
6	6.84	18.84	0.38	6.42	1.96	0.55	5.98	0.47	2.38	26.17	16.00	21.00	23.00
7	2.88	0.90	29.69	0.17	1.13	0.22	7.14	1.25	2.72	23.89	16.00	21.00	23.00
8	19.53	2.57	0.31	7.57	1.98	3.05	8.75	0.00	26.23	0.02	16.00	23.00	30.00
9	6.15	7.53	0.19	19.27	1.25	0.62	7.99	20.54	1.19	5.28	15.00	22.00	24.00
Total	17.10	2.97	1.14	9.47	2.41	1.90	8.33	1.74	3.83	21.11	17.00	21.00	23.00
Men													
1	31.43	0.17	0.25	0.11	2.36	0.68	7.72	0.28	2.28	24.73	16.00	23.00	25.00
2	30.21	0.14	0.35	0.11	3.54	0.65	14.33	0.21	3.33	17.13	18.00	29.00	32.00
3	30.78	0.24	0.45	0.09	2.76	0.68	31.55	0.03	3.38	0.04	17.00	36.00	48.00
4	8.00	7.01	2.70	0.07	2.34	14.88	15.66	0.93	4.03	14.38	16.00	25.00	27.00
5	30.65	0.11	0.38	0.10	3.02	0.73	11.18	0.00	23.76	0.06	17.00	25.00	39.00
6	31.65	0.15	0.13	0.01	2.64	0.42	8.91	14.22	1.84	10.03	16.00	23.00	25.00
Total	30.32	0.39	0.37	0.10	2.70	1.13	11.16	0.99	4.01	18.84	17.00	24.00	26.00

The life course clusters for men are named as follows: 1. "Partnered Fathers, FT Work"; 2. "Late-Partnered Fathers, FT Work"; 3. "Single Men, FT Work"; 4. "Partnered Fathers, Weak LM attachment"; 5. "Partnered Men, FT Work"; 6. "Single Fathers, FT Work"; 7. "Partnered Mothers, Unpaid Caregiver"; 8. "Partnered Mothers, FT Work"; 9. "Partnered Mothers, Little (Un)paid Work"; 4. "Single Mothers, FT Work"; 5. "Single Women, FT Work"; 6. "Partnered Mothers, FT Work"; 7. "Partnered Mothers, FT Work"; 8. "Partnered Mothers, Discontinued FT Work"; 9. "Single Mothers, FT Work." Data are from SHARELIFE's Job Episodes Panel, release 9.0.0 (Brugiavini et al. 2019)⁶. Own estimates.

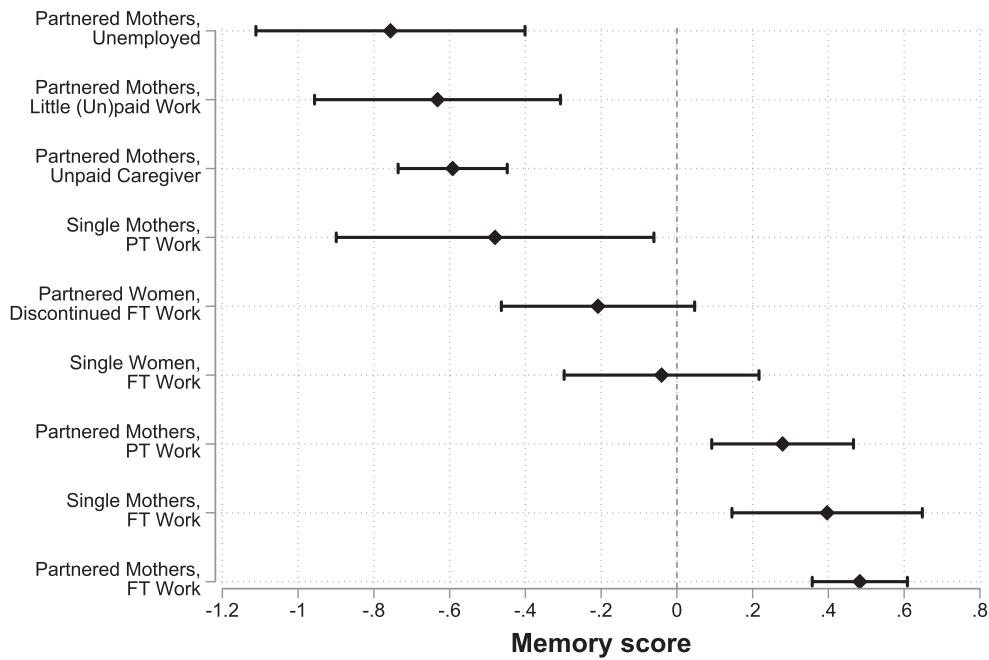


Figure 1. Random-effects linear regression models of the associations between life course types and memory in women (binary contrasts). Binary contrasts indicate the difference in the coefficients of each category of the independent variable versus the weighted mean of the other categories. Complete models in Table S3.

men’s memory in later life, while partnership dissolution or weak labor market attachment are linked to lower memory performance. This highlights the critical role of both family and employment for men’s later-life cognition.

Country comparisons

Figure 3 shows cross-country differences in associations between work–family trajectories and memory. Life course types are com-

pared within genders using contrasts of marginal effects and partnered parents in full-time employment as the reference category (Appendix S1, Tables S10 for women and S11 for men).

Women with complete family roles but absent work roles (Clusters 1, 3, and 7) exhibit poorer memory than women with integrated work–family trajectories in all countries except the Netherlands. In Italy, unemployed partnered mothers have the lowest scores (Cluster 7: $b = -1.16$; $P < .001$), followed by those

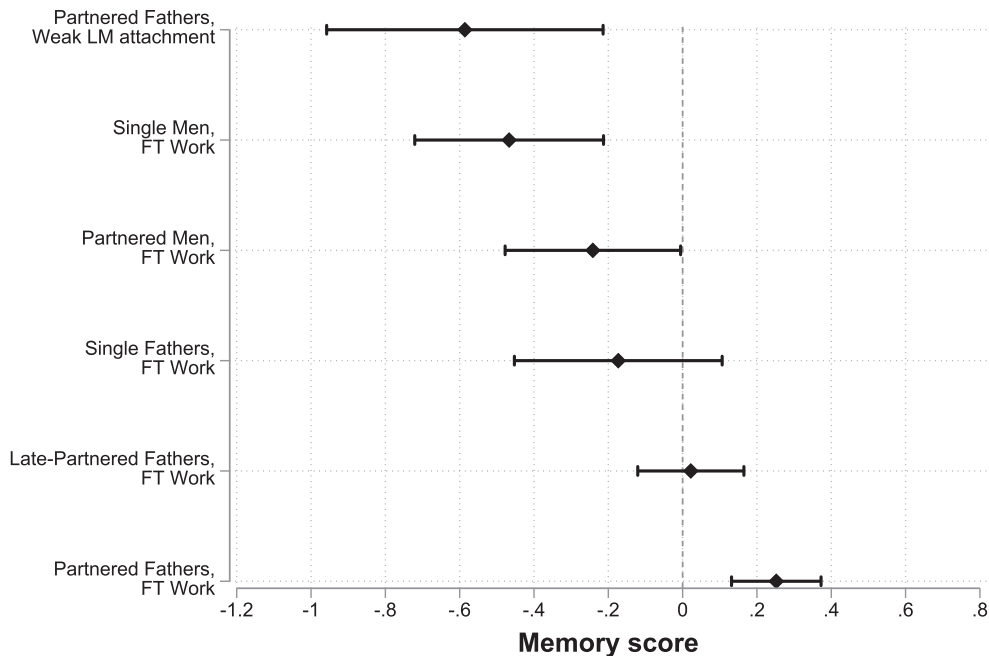


Figure 2. Random-effects linear regression models of the associations between life course types and memory in men (binary contrasts). Binary contrasts indicate the difference in the coefficients of each category of the independent variable versus the weighted mean of the other categories. Complete models in Table S6.

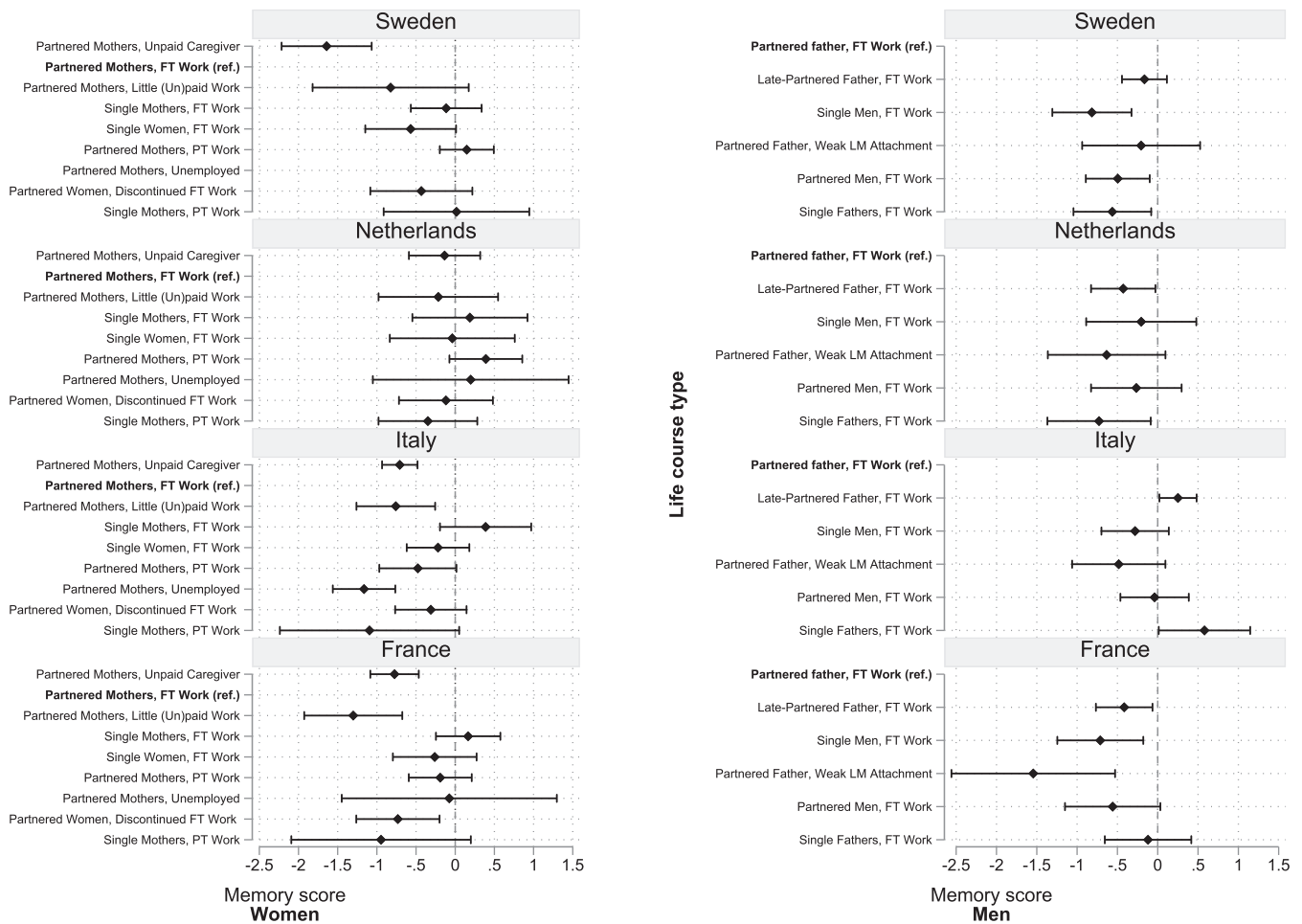


Figure 3. Random-effects linear regression models of the associations between life course types and memory (interaction between life course clusters and country). Contrasts of average marginal effects. For both male and female samples, the reference category consists of partnered parents in full-time employment. Complete models in [Tables S3 \(Model 2\)](#) and [S7](#).

with limited (un)paid work (Cluster 3: $b = -0.76$; $P < .01$) and extended unpaid domestic work (Cluster 1: $b = -0.71$; $P < .001$). In France, memory is lower for partnered mothers in Cluster 3 ($b = -1.30$; $P < .001$) and Cluster 1 ($b = -0.77$; $P < .001$). In Sweden, only women with long spells of unpaid domestic work show a statistically significant association (Cluster 1: $b = -1.64$; $P < .001$), exhibiting the lowest memory overall.

Lacking family roles yields imprecise estimates for women in full-time work (Clusters 4 and 5), as the coefficients are not statistically significant in most countries. In Italy, the absence of a partner is associated with lower memory among mothers with part-time histories, comparing Cluster 9 (“Single Mothers, PT Work”: $b = -1.09$; $P < .1$) to Cluster 6 (“Partnered Mothers, PT Work”: $b = -0.48$; $P < .1$). Conversely, reconciling work and family (Cluster 6) is protective for partnered mothers in the Netherlands ($b = +0.39$; $P < .1$).

For men, the importance of family roles can be assessed by comparing Clusters 3 (“Single Men, FT Work”), 5 (“Partnered Men, FT Work”), and 6 (“Single Fathers, FT Work”) against those with “integrated histories” (Cluster 1: “Partnered Fathers, FT Work”). Single men exhibit the lowest cognitive scores in Sweden ($b = -0.82$; $P < .001$) and France ($b = -0.71$; $P < .01$), with similar patterns for partnered men (Sweden: $b = -0.50$; $P < .05$; France: $b = -0.56$; $P < .10$). For single fathers (Cluster 6), cognitive scores are lower in Sweden ($b = -0.56$; $P < .10$) and the Netherlands ($b = -0.73$; $P < .10$).

Non-integrated trajectories with weak labor market attachment and complete family formation (Cluster 4) are associated with lower cognitive health among men only in France ($b = -1.54$; $P < .05$) and the Netherlands ($b = -0.63$; $P < .10$).

Discussion

This study adopted a gendered, comparative life course approach to investigate how combinations of paid work, parenthood, and partnership from ages 15 to 49 years relate to cognitive functioning (ie, memory) after midlife. Our study supports prior research highlighting the later-life cognitive benefits of combining employment with family roles for both men and women.^{29,96} However, gender differences emerge. Supporting Hypothesis H1a (exposure to work), continuous full-time employment appears more beneficial for women’s memory than for men. Although weak labor market attachment predicts the lowest memory levels in both genders, the disadvantage is greater for women. Contrary to expectations, women with career breaks near parenthood and part-time work showed no memory advantage over those with integrated trajectories (Hypothesis H2—reconciliation advantage).

Regarding the absence of family roles, we found that variability in men’s family trajectories was more strongly associated with memory than for women (Hypothesis H3—centrality of family roles). Continuously employed men with complete family roles

showed the highest memory, while those lacking parenthood and partnerships exhibited lower memory functioning. While motherhood appears to be a stronger contributor to cognitive health than partnership, for men, the absence of both family relationships seems relevant for memory functioning.

A strength of our study is the comparative approach to the long-term ramifications of multidimensional work–family regimes.⁹⁷ Consistent with findings on physical health,²¹ women’s labor market absence was most strongly linked to lower memory in Italy, least in Sweden and the Netherlands, and moderately in France—partially supporting Hypothesis 4, which posited that subprotective welfare systems increase later-life cognitive vulnerability to adverse employment–family combinations.^{61–63} An exception was Sweden, a country with strong dual-earner and gender equality support. Herein, prolonged unpaid domestic work correlated with lower women’s memory, possibly because of higher expectations for women’s continuous labor market participation,⁹⁸ which may reduce the socioemotional benefits of parenthood.^{96,99} In France, childlessness correlated with lower cognition, consistent with policies supporting parenthood and (female) employment reconciliation. As expected, the Netherlands’ hybrid regime¹⁰⁰ exhibited small differences across trajectories, suggesting compensatory resources across employment and family domains.

For men, results were less aligned with Hypothesis 4. Protective associations emerged from full-time work combined with relationship dissolution in Italy, while a lack of partnership and parenthood predicted negative cognition in the other countries, possibly reflecting familism’s role in fostering social reserves via higher provision of family support^{101,102} in times of marital union dissolution.^{103,104}

Some limitations suggest directions for future research. First, the study relied on retrospective information, which can be subject to memory errors. However, the retrospective SHARE data are generally reliable, with less than 10% recall errors for event timing.¹⁰⁵ Second, although our study assessed memory over time, it may still face selection bias issues.²⁶ We mitigated this potential issue by including childhood health measures and respondents’ self-reported relative performance in mathematics and language at age ten as confounders. More objective childhood health markers would be desired to better address selection bias.²⁶ Third, we relied on a theoretically motivated selection of countries. Future studies could benefit from a broader comparative analysis, potentially including emerging economies, to understand the generalizability of the observed patterns. Finally, we acknowledge that the identified life course clusters reflect ideal-typical trajectories, which may not fully capture rare or highly fragmented work–family histories. Nevertheless, this approach revealed complex interdependencies between employment, parenthood, and partnership, identifying nuanced patterns that single-item survey measures would overlook. The strength of MCSQA lies in its capacity to identify and quantify complex trajectories involving events, transitions, and cross-domain interdependencies.^{85,86}

Despite limitations, our study advances understanding of how work–family trajectories, gender, and cognitive health intertwine in later life. Firstly, supporting the expectation that reserves accumulate through cognitive stimulation in employment¹⁸ and social relations,¹⁷ we foreground cognitive outcomes, extending prior research primarily focused on physical health outcomes²¹ or well-being.^{28,53} Secondly, our study shows reserve accumulation is gendered, clarifying how employment and family roles jointly shape later-life cognitive health. Thirdly, our comparative approach reveals welfare states’ capacity to buffer cognitive risks

from adverse early-life work–family combinations, along with the compensatory role of familistic regimes and family support in facing adversities.¹⁰¹

Our findings contribute to research on social determinants of cognitive health in later life. The observed cross-country differences highlight how institutional policies can promote life courses that build cognitive and relational reserves and enhance cognitive health. Considering their “cognitive footprint” of family-friendly employment policies can help sustain cognitive health across all ages.¹⁰⁶ Policies encouraging full-time employment, especially for women, and promoting shared family responsibilities may protect cognitive reserves. Rethinking work–family reconciliation for both genders represents a health-protective policy priority worth evaluating, as these issues are increasingly vital in a “knowledge-based society”. Our study supports interventions aimed at stabilizing work–family life courses to combat the growing challenges of cognitive decline and dementia among aging populations.

Acknowledgments

The authors would like to thank the editor and the anonymous reviewers for their helpful comments. We are grateful to the European Consortium of Sociological Research (ECSR) and to the participants in the ECSR Network Workshop “Social Institutions and Cognitive Health in Older Age” (February 14–15, 2024, University of Hamburg) for their support and valuable feedback. Earlier versions of this paper were presented at the European Consortium for Sociological Research (ECSR) Conference (Prague, Czech Republic, September 18–20, 2023), the European Population Conference (EPC) 2024 (Edinburgh, UK, June 12–15, 2024), and the European Society of Health and Medical Sociology (ESHMS) 20th Conference “Intersectionality & Inclusion in Health” (University of Antwerp, Belgium, July 3–5, 2024). Damiano Uccheddu is a Postdoctoral Researcher of the Belgian National Fund for Scientific Research (F.R.S.-FNRS), whose support is gratefully acknowledged.

Supplementary material

Supplementary material is available at *American Journal of Epidemiology* online.

Funding

None declared.

Conflict of interest

The authors report no conflict of interest.

Data availability

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.⁷²) for methodological details. Additionally, this paper uses data from the generated Job Episodes Panel (DOI: 10.6103/SHARE.jep.900), see Brugiavini et al.⁷⁶ 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). Replication files are available at the second author's websites: <https://damianouccheddu.com/> and <https://github.com/damiano-uccheddu/>.

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