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Association of work-family experience with mid- and late-life memory decline in US women

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ABSTRACT

Objective: To test the hypothesis that lifecourse patterns of employment, marriage, and childrearing influence later-life rate of memory decline among women, we examined the relationship of work-family experiences between ages 16-50 years and memory decline after age 55 years among U.S. women.

Methods: Participants were women ages ≥55 years in the Health and Retirement Study. Participants reported employment, marital, and parenthood statuses between ages 16-50 years. Sequence analysis was used to group women with similar work-family life histories; we identified five profiles characterized by similar timing and transitions of combined work, marital, and parenthood statuses. Memory performance was assessed biennially 1995-2016. We estimated associations between work-family profiles and later-life memory decline with linear mixed-effects models adjusted for practice effects, baseline age, race/ethnicity, birth region, childhood socioeconomic status, and educational attainment.

Results: There were 6,189 study participants (n=488 working non-mothers, n=4,326 working married mothers, n=530 working single mothers, n=319 non-working single mothers, n=526 non-working married mothers). Mean baseline age was 57.2 years; average follow-up was 12.3 years. Between ages 55-60, memory scores were similar across work-family profiles. After age 60, average rate of memory decline was 50% greater among women whose work-family profiles did not include working for pay post-childbearing, compared with those who were working mothers.

Conclusions: Women who worked for pay in early adulthood and midlife experienced slower rates of later-life memory decline, regardless of marital and parenthood status, suggesting participation in the paid labor force may protect against later-life memory decline.

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Nearly two-thirds of Americans living with Alzheimer's dementia are women,[1,2] highlighting the importance of identifying modifiable determinants of later-life memory decline and dementia risk among women. Most research on sex/gender in Alzheimer's dementia focuses on sex-linked biology; less research has considered social aspects of gender that could influence Alzheimer's dementia risk.[3,4]

Lifecourse patterns of employment, child-rearing, and marriage changed dramatically for U.S. women over the past century.[5] These changes may have implications for later-life cognitive health. For example, paid labor force participation could promote later-life cognitive health via cognitive stimulation,[6–9] social engagement,[10,11] and financial security.[12] Conversely, prolonged stress from single motherhood could negatively affect later-life cognitive health.[13–16] Prior studies evaluating relations between work-family profiles and health among U.S. women suggest rates of cardiovascular disease, stroke, and mortality in later life are lowest among married mothers who participated in the paid labor force and highest among those with prolonged periods of single motherhood.[17,18]

Memory decline is the hallmark of Alzheimer's dementia.[2] Examining later-life memory enables disentanglement of factors influencing pre-morbid level of memory function and memory decline; the latter is more representative of accumulation of dementia-related neuropathology.[19] Our objective was to estimate effects of work-family experiences between early adulthood and midlife (ages 16-50 years) on later-life rate of memory decline (ages 55 and older) among U.S. women. We hypothesized that after accounting for education and other potential early-life confounders, later-life memory decline would be slowest among married mothers who participated in the paid labor force and fastest among women with prolonged periods of single motherhood, especially those who did not engage in paid work.

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METHODS

Study population

The Health and Retirement Study (HRS) is national cohort representing non-institutionalized adults over age 50 years in the U.S.[20] Biennial interviews are available through 2016. Our analyses included HRS participants who were (1) women born between January 1935 and February 1956, (2) participated in at least one memory assessment between 1995 and 2016 when they were age 55 years or older, (3) responded to study questions about dates of employment, marriage, and births of children, (4) had complete covariate information. We excluded women without any memory assessments at ages ≥55 years to minimize potential reverse causation.

Standard protocol approvals, registrations, and patient consents

HRS participants provided verbal informed consent. HRS data collection is approved by the University of Michigan Institutional Review Board. The present study used publicly available de-identified data and was certified exempt from review by the University of California, Los Angeles Institutional Review Board.

Lifecourse work-family profiles

Lifecourse work-family profiles were conceptualized and sequenced by Sabbath et al.[17] Their methods are summarized here. Patterns and timing of work-family combinations were generated based on self-reported dates of employment, marital, and parenthood statuses between ages 16 and 50 years. For each woman, an individual work-family life trajectory was created from binary measures of waged employment (yes/no), marriage (yes/no), and children under 18 years (yes/no) at every age between 16 and 50. Sequence analysis[21–23] was used to group women with similar work-family trajectories. The objective was to classify each woman by the prototypical sequence most closely resembling her work-family trajectory. Sequence analysis simultaneously accounts for order, timing, and duration of exposures, clustering individuals based on commonalities in timing of transition between elements and time spent in

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each element. It entails a two-step data reduction technique: (1) optimal matching analysis to minimize the "cost" required to transform the work-family trajectories of any two given women to match and (2) hierarchical cluster analysis to identify the optimal number of work-family profile clusters by using the matrix of optimal matching distances.

Sequence analysis identified a solution of seven work-family profile clusters, which produced maximum within-cluster homogeneity and maximum between-cluster heterogeneity: (1) women who did not have children and participated in the paid labor force ("working non-mothers"); (2) married women with children who continuously participated in the paid labor force ("working married mothers who continuously worked"); (3) married women with children who took a short amount of time out of the paid labor force when their children were young ("working married mothers who went back to work earlier"); (4) married women with children who took more time out of the paid labor force when their children were young ("working married mothers who went back to work later"); (5) women who experienced a long spell as a single mother not engaged in the paid labor force ("non-working single mothers"); (6) women who experienced a long spell as a single mother who participated in the paid labor force ("working single mothers"); and (7) married women with children who never engaged in the paid labor force ("non-working married mothers"). **Figure e-1** visually displays the work-family profiles. Initial analyses showed very similar later-life memory trajectories for married women with children who participated in the paid labor force, regardless of whether they took time out of the labor force when their children were young. Thus, our primary results combine the three groups of married working mothers together ("working married mothers"), resulting in five prototypical work-family profiles. Results for all seven prototypical work-family profiles are shown in **Appendix e-2**.

Memory assessment

We used a previously developed memory composite score combining proxy and direct memory assessments for longitudinal analyses.[24] For ease of interpretation, memory composite scores were standardized to the baseline analytic sample. All participants interviewed directly completed an

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immediate and delayed recall of a 10-word list. For individuals too impaired to participate, proxy informants, typically spouses, assessed the participants' memory on a 5-item Likert scale and completed the 16-item Informant Questionnaire for Cognitive Decline (IQCODE).[25,26] A total of 1.7% of all memory assessments included in the study were based on proxy scores.

Death

At each biennial study wave, all previously surviving participants were contacted. If death was reported, date of death was obtained via interview with next-of-kin.[27]

Covariates

All models were adjusted for practice effects with an indicator variable for first memory assessment.[28] We additionally included as covariates variables conceptualized as potential confounders of effects of work-family profiles on later-life memory trajectories. All potential confounders were temporally prior to the lifecourse period included in work-family sequences (ages 16-50 years). Age at baseline memory assessment was considered as age in years at first memory assessment. Race/ethnicity was based on self-report (non-Latino Black/African American, non-Latino White, and Latino/Hispanic or "other" racial/ethnic group). Birth in the Southern U.S. ("Southern birth"), which has been shown to be associated with stroke[29,30] and poorer later-life cognitive health,[31–33] was self-reported state of birth classified by U.S. Census region (DE, MD, DC, VA, WV, NC, SC, GA FL, KT, TN, MS, AL, OK, TX, AR, LA). Childhood socioeconomic status was measured with a theoretically-driven, validated index of self-reported factors.[34] Self-reported educational attainment was dichotomized as <12 versus ≥12 years to minimize overlap between timing of educational attainment and work-family profiles.

To further characterize the sample, we examined two additional covariates that we did not conceptualize as potential confounders: number of children and household wealth calculated as the sum of all wealth components (excluding second home) less all debt reported at the HRS visit closest to age 55 years.[35]

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Statistical analysis

We used linear mixed effects models[36] to estimate effects of work-family profiles on later-life rate of memory decline starting at age 55. We used age centered at 65 years as the timescale and modeled the time trend with linear splines with knots every 5 years at ages 60, 65, 70, and 75 to accommodate nonlinearities and included interactions between work-family profile group and time trend splines. We included three correlated random effects: intercept, linear slope, and linear spline with a knot at age 65 years to model the within-person variance-covariance between observations. We considered models with covariate sets guided by our conceptual model with the goal of controlling for confounders of effects of work-family profiles on later-life memory decline. Model 1 adjusted for practice effects and age at baseline memory assessment. Model 2 additionally adjusted for race/ethnicity and Southern birth and interaction terms for both with the time trend splines. Model 3 additionally adjusted for childhood socioeconomic status and interaction terms between childhood socioeconomic status and the time trend splines. Model 4 additionally adjusted for educational attainment (<12 vs. ≥12 years) and interaction terms with time trend splines.

To visually represent findings, we plotted estimated memory trajectories for each work-family profile holding covariates constant at reference values: age 55 at baseline memory assessment, non-Latino White, birth outside the Southern U.S., childhood socioeconomic status score of 0, and ≥12 years of education for the fully-adjusted model.

To assist with interpretation of the magnitude of the associations between work-family profiles and later-life memory decline, we translated group differences in average memory scores estimated from fully-adjusted linear mixed effects models to risk ratios and risk differences for memory impairment at age 70. We computed the risk ratio and risk difference estimates assuming 10% prevalence of memory impairment at age 70 among working married mothers based on the literature;[37] we repeated calculations assuming 5% prevalence (details provided in **Appendix e-3**).

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Primary analyses evaluated the five work-family profiles. In a secondary analysis, we compared memory trajectories for the "working" profiles and "non-working" profiles. "Working" profiles included working non-mothers, working married mothers, and working single mothers. "Non-working" profiles included non-working single mothers and non-working married mothers.

Sensitivity analyses

To evaluate potential selective survival, we compared characteristics of participants who died during the study period, those lost to follow-up (i.e., those who did not participate in the 2016 memory assessment, but were presumed alive), and those who participated in the 2016 memory assessment. Additionally, we repeated analyses using shared parameter (shared random intercept and slope terms) joint longitudinal-survival models to account for selective survival using the JMFit macro.[38] Based on available software, we used study time as the timescale without splines.

We repeated analyses using time since baseline memory assessment as the timescale, with linear splines with knots at 4, 8, and 12 years and random effects for intercept and slope spline with a knot at 8 years.

Statistical analyses were performed in SAS version 9.4 (SAS Institute Inc.).

Data Availability

The data used for analyses are available from the HRS website (https://hrs.isr.umich.edu/data-products).

RESULTS

The analytic sample included 6,189 women. Mean age at baseline memory assessment was 57.2 years (range 55.0-74.5). Mean age at baseline memory assessment was oldest among non-working married mothers and youngest among working non-mothers (**Table 1**). As a group, working non-mothers were youngest at baseline memory assessment and had more advantaged backgrounds with regards to

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race/ethnicity, place of birth, childhood socioeconomic status index, and educational attainment. Single mothers, both working and non-working, tended to have less advantaged backgrounds. Among mothers, average number of children ranged from 2.2 among non-working single mothers to 3.4 among non-working married mothers. At age 55, non-working single mothers and working single mothers tended to have the lowest wealth, working non-mothers and working married mothers tended to have the highest wealth, and non-working married mothers tended to have intermediate wealth.

Mean baseline memory scores were highest among working non-mothers and working married mothers and lowest among single mothers. Over an average follow-up 12.3 years (range 0-21.2 years), participants participated in an average of 7.0 memory assessments (range: 1-11). Average follow-up length and number of memory assessments was longest among working married mothers and shortest among non-working single mothers.

Estimates from linear mixed effects models adjusted for practice effects and age at first memory assessment (Model 1) suggested lower average memory scores at age 55 years among single mothers (working and non-working) than other work-family profile groups (**Figure e-3, Table e-2**). After adjusting for practice effects and potential confounders, there were no major differences in average memory scores at age 55 years by work-family profile group (**Figure 1, Table 2, Table e-2**). Average rate of memory score decline between ages 55 and 60 years may have been slightly faster among non-working married mothers compared with working married mothers (**Table 2, Table e-2**).

After age 60 years, average rate of memory score decline was on average slower for women who participated in the paid labor force compared with women who did not. For example, between ages 60 and 70, average memory score decline was 0.69 standardized units (95% CI: -0.75, -0.63) among working married mothers. Over the same age span, average memory score decline was 1.25 standardized units (95% CI: -1.46, -1.03) among non-working single mothers and 1.09 standardized units (95% CI: -1.23, -0.94) among non-working married mothers (**Table 3**). Thus, average memory score decline between ages 60 and 70 was more than 50% greater among women without paid labor force participation, compared

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with working married mothers. Overall, average rate of memory score decline was similar for the two groups who did not engage in paid work: non-working single mothers and non-working married mothers. There was some suggestion that after age 75, average rate of memory score decline was slightly faster for working single mothers versus working married mothers, although estimates after age 75 were imprecise due to small number of observations (**Table e-2**).

The 0.57 standardized unit difference in average memory scores at age 70 between non-working single mothers and working married mothers translates to a 2.02 risk ratio for memory impairment and a 10.2% risk difference for memory impairment assuming 10% population prevalence of memory impairment among working married mothers (**Appendix e-3**). Similarly, the 0.53 standardized unit difference in average memory scores at age 70 between non-working married mothers and working married mothers translates to a 1.94 risk ratio for memory impairment and a 9.4% risk difference for memory impairment. Estimated risk ratios were larger and risk differences were smaller assuming 5% population prevalence of memory impairment among working married mothers (**Appendix e-3**). In secondary analyses comparing memory trajectories for the three work-family profiles that included paid labor force participation and the two work-family profiles that did not include paid labor force participation, differences in average rates of memory decline were pronounced: between ages 60 and 70, average memory score decline was -0.44 standardized units (95% CI: -0.56, -0.32) greater among women without paid labor force participation compared with women who participated in the paid labor force (**Figure 2, Table e-3, Table e-4**).

In sensitivity analyses evaluating the potential influence of selective mortality on study results, we found that 63.4% of study participants remained in the study through the 2016 study wave, 19.5% died prior to 2016, and 17.1% were lost to follow-up (i.e., did not participate in the 2016 wave, but presumed alive). Cumulative mortality was highest among non-working single mothers and lowest among working married mothers and working non-mothers. Loss to follow-up was highest among non-working married mothers (**Table 1**). Compared with women who remained in the study, those who died tended to be older at baseline, have lower baseline memory scores, and have less advantaged early-life backgrounds

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(**Table e-5**). Women lost to follow-up were similar to those who remained, although women lost to follow-up were on average slightly older at baseline and had higher childhood socioeconomic status. Results from joint-longitudinal models to account for selective survival were qualitatively similar to results from linear mixed effects models (**Table e-6**), as were models using time since baseline instead of age as the timescale (**Figure e-4**).

DISCUSSION

In a national cohort study of U.S. women, rates of later-life memory decline were slower among women whose work-family trajectories included substantial periods of engagement in the paid labor force between ages 16 and 50 years. Conversely, rates of later-life memory decline were faster among women without paid labor force participation during early adulthood and midlife. In other words, results suggest that participating in the paid labor force protected against memory decline, regardless of family structure.

We hypothesized that after accounting for potential early-life confounders, rates of later-life memory decline would be slowest among married mothers who participated in the paid labor force and fastest among women who experienced prolonged periods of single motherhood, especially those who had not engaged in the paid labor force. Our hypothesis was based on literature linking labor force participation to later-life cognitive health[6–9] and literature linking family structure to women's later-life health. The latter studies found that U.S. and European women who experienced prolonged periods of single motherhood experienced greater risk of cardiovascular disease and stroke,[18] physical disability,[13] and mortality[16,17] compared with working married mothers. However, the present study suggests that paid labor force participation protects against memory decline, regardless of family structure. Moreover, timing of labor force participation did not appear to matter: rates of memory decline were similar for married working mothers, including those who consistently worked, those who stayed home with children for a few years before re-entering the paid labor force, and those who stayed home with children for many years before re-entering the paid labor force. This suggests that the cognitive benefits of labor force

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participation may extend far into adulthood. This is consistent with a recent national study reporting that high-skill employment during working-age predicted better numerical reasoning scores in later life, but this benefit plateaued after four-years of high-skill employment.[9]

To our knowledge, this is the first study to evaluate the influence of work-family profiles on later-life cognitive decline, though our finding that paid labor force participation protects against later-life memory decline is supported by prior research. A recent study among European women found that partnered mothers who worked full- or part-time had the highest levels of cognitive performance in later life and women who spent most of their lives outside the paid labor force had the lowest levels cognitive performance in later life.[39] Interestingly, the authors found that women who worked part-time had higher levels of cognitive performance than women who worked full-time. However, this study examined cross-sectional cognitive performance, while the present study examined rates of cognitive change. Prior studies have documented protective associations between higher complexity of main lifetime occupation and later-life cognitive health[6–9] and harmful associations between retirement and cognitive health[40,41] in U.S. and European cohorts. In addition to cognitive stimulation, paid labor force participation could promote later-cognitive health by promoting social engagement, which has been linked to later-life cognitive health.[10,11]

Our finding that women who participated in the paid labor force experienced slower later-life memory decline is unlikely to be completely attributable to confounding by early-life social factors. For example, in fully-adjusted models, average rates of later-life memory decline were slower for working single mothers compared with non-working married mothers, even though non-working married mothers came from more privileged backgrounds. Additionally, our analysis accounted for potential early-life confounders, including race/ethnicity, Southern birth, childhood socioeconomic status, and educational attainment. Notably, in models only adjusting for practice effects and age at baseline memory assessment, there were sizable differences in memory scores between work-family profiles: at age 55, average memory scores among single mothers (working and non-working) were more than four tenths of a standardized unit lower than average memory scores among working married mothers. In fully-adjusted

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models, there were no differences in average memory scores between groups at age 55, suggesting that these models accounted for confounding by early-life factors that influence both work-family profiles and memory performance at age 55.

Strengths of our study include the large, national cohort study design with long follow-up, lifecourse characterization of work-family profiles, and focus on women's social experiences. By evaluating rates of later-life memory decline, we were able to distinguish between pre-morbid memory function and later-life memory decline, which is more representative of accumulation of dementia-related pathology.[19] Furthermore, we evaluated work-family profiles between ages 16 and 50 and memory decline starting at age 55, minimizing potential for reverse causation. While level memory function in adulthood could influence work-family profiles, after adjusting for potential confounders, memory scores were similar across work-family profiles between ages 55 and 60. Our primary outcome was rate of memory decline, and it is unlikely that memory decline prior to age 50 had a significant influence on women's work-family profiles between ages 16 and 50.

This study also has limitations. The present study assessed marriage, but did not assess non-marital partnerships. Because same-sex marriages were not legal in the U.S. during the time of exposure assessment for the present study, this would particularly impact measurement of single motherhood among sexual minority women. The present study also lacks the capacity to disambiguate between cisgender and transgender women; thus, it is unclear to what degree work-family experiences impact later-life memory decline among transgender women. Characterization of work-family profiles relied on retrospective reporting of dates of employment, marriage, and parenthood. We did not examine nuances of the three elements of work-family profiles; most notably, we could not distinguish between full- and part-time employment. Memory performance was assessed using a brief assessment (immediate and delayed word recall), and we lack assessment of other cognitive domains. Additionally, we focused exclusively on working for pay. If volunteering throughout early adulthood and midlife confers benefits to later-life cognitive health, including women who volunteered in the non-working profiles would bias results towards the null. A potential confounder not measured in our analysis is rural residence in early

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adulthood and midlife, which could influence access to employment and childcare. If rural residence in this lifecourse period made participation in the paid labor force more difficult for women and was also associated with faster later-life memory decline, this could contribute to observed associations between engagement in the paid labor force and slower later-life memory decline. Additionally, residual confounding, particularly from time-dependent confounder-mediators, cannot be ruled out. Development of methods for accounting for time-dependent confounder-mediators in sequence analysis is an important area of future research.

In a national study, women who participated in the paid labor force between early adulthood and midlife, regardless of family structure, experienced slower memory decline in later-life than their non-working peers, suggesting paid labor force participation plays a strong role in later-life cognitive health. These early findings suggest that policies that support paid labor force participation could be an effective population-level strategy to prevent later-life memory decline. Important areas of future research include disentangling potential mechanisms driving observed associations.

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Appendix 1: Authors

Name	Location	Contributions
Elizabeth Rose Mayeda, PhD, MPH	University of California, Los Angeles	Designed and conceptualized study; statistical expertise; interpreted the data; revised the manuscript for intellectual content
Taylor M Mobley, MPH	University of California, Los Angeles	Analyzed and interpreted the data under the supervision of Drs. Mayeda and Weiss; revised the manuscript for intellectual content
Robert E Weiss, PhD	University of California, Los Angeles	Statistical expertise; analyzed and interpreted the data; revised the manuscript for intellectual content
Audrey R Murchland, MPH	Harvard	Quality checked data analysis scripts; interpreted the data; revised the manuscript for intellectual content
Lisa F Berkman, PhD	Harvard	Interpreted the data; revised the manuscript for intellectual content
Erika L Sabbath, ScD	Boston College	Designed and conceptualized study; interpreted the data; revised the manuscript for intellectual content

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Figure 1. Estimated memory trajectories (95% CIs) by work-family profile among women born 1935-1956 in the Health and Retirement Study

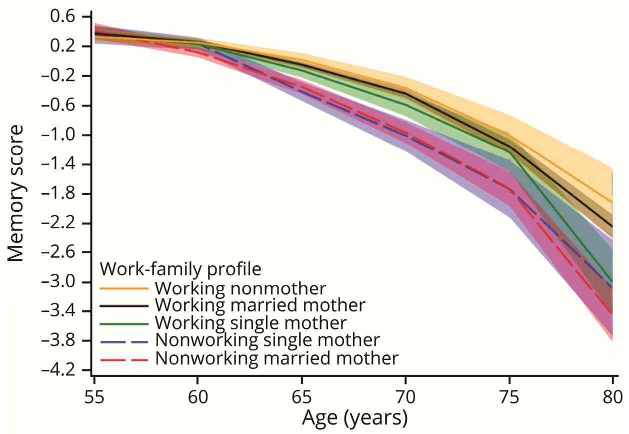

Figure 2. Estimated memory trajectories (95% CIs) by working versus non-working profiles among women born 1935-1956 in the Health and Retirement Study

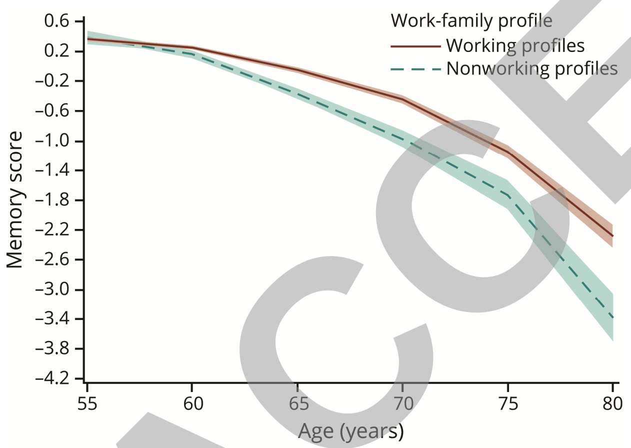

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Table 1. Characteristics of the sample by work-family profile

	Working non-mother (n=488)	Working married mother (n=4,326)	Working single mother (n=530)	Non-working single mother (n=319)	Non-working married mother (n=526)
Birth year, mean (SD)	1945.2 (5.8)	1942.9 (5.6)	1944.2 (5.7)	1945.1 (5.8)	1941.9 (5.6)
Age (years) at baseline memory assessment, mean (SD)	56.7 (1.7)	57.2 (2.0)	56.9 (1.8)	57.1 (2.2)	57.7 (2.3)
Race/ethnicity, n (%)					
Black (non-Latino)	69 (14.1)	686 (15.9)	238 (44.9)	157 (49.2)	83 (15.8)
White (non-Latino)	406 (83.2)	3,518 (81.3)	280 (52.8)	143 (44.8)	415 (78.9)
Latino or other	13 (2.7)	122 (2.8)	12 (2.3)	19 (6.0)	28 (5.3)
Southern birth[a], n (%)	149 (30.5)	1,601 (37.0)	247 (46.6)	157 (49.2)	234 (44.5)
Childhood SES index, mean (SD)	0.26 (0.99)	0.04 (0.96)	-0.17 (1.02)	-0.38 (1.12)	-0.20 (1.10)
≥12 years of education, n (%)	456 (93.4)	3,685 (85.2)	412 (77.7)	196 (61.4)	330 (62.7)
Number of children, mean (SD)	0.1 (0.5)	2.8 (1.4)	2.4 (1.5)	2.2 (2.3)	3.4 (1.8)
Household wealth at age 55					
Quintile 1	80 (16.4)	624 (14.4)	215 (40.6)	185 (58.0)	133 (25.3)
Quintile 2	68 (13.9)	868 (20.1)	119 (22.5)	69 (21.6)	114 (21.7)
Quintile 3	86 (17.6)	952 (22.0)	74 (14.0)	26 (8.2)	100 (19.0)
Quintile 4	110 (22.5)	946 (21.9)	68 (12.8)	19 (6.0)	96 (18.3)
Quintile 5	144 (29.5)	936 (21.6)	54 (10.2)	20 (6.3)	83 (15.8)
Practice effects indicator, n (%)	50 (10.2)	235 (5.4)	54 (10.2)	33 (10.3)	14 (2.7)
Baseline memory score, mean (SD)	0.09 (0.88)	0.07 (0.94)	-0.36 (1.01)	-0.44 (1.26)	-0.04 (1.22)
No. memory assessments, mean (SD)	6.4 (3.0)	7.3 (3.0)	6.7 (3.1)	5.8 (2.8)	6.8 (3.2)
Follow-up time (years), mean (SD)	10.9 (6.0)	12.8 (6.0)	11.6 (6.1)	9.9 (5.8)	12.1 (6.4)
Status at end of study, n (%)					
In study	317 (65.0)	2,821 (65.2)	328 (61.9)	180 (56.4)	276 (52.5)
Died	79 (16.2)	773 (17.9)	128 (24.2)	95 (29.8)	132 (25.1)
Lost to follow-up	92 (18.9)	732 (16.9)	74 (14.0)	44 (13.8)	118 (22.4)

SES = socioeconomic status; SD = standard deviation; Q1 = first quartile; Q3 = third quartile

[a]Southern birth was based on self-reported state of birth classified by U.S. Census region, which includes the following states: DE, MD, DC, VA, WV, NC, SC, GA FL, KT, TN, MS, AL, OK, TX, AR, LA.

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Table 2. Estimated memory scores (95% CI) by work-family profile and age[a]

Age (years)	Working non-mother	Working married mother	Working single mother	Non-working single mother	Non-working married mother
55	0.33 (0.24, 0.42)	0.37 (0.33, 0.41)	0.38 (0.28, 0.47)	0.36 (0.24, 0.48)	0.41 (0.31, 0.52)
60	0.25 (0.18, 0.32)	0.25 (0.22, 0.28)	0.23 (0.16, 0.29)	0.24 (0.15, 0.32)	0.12 (0.05, 0.19)
65	0.02 (-0.08, 0.11)	-0.05 (-0.09, -0.01)	-0.13 (-0.22, -0.03)	-0.41 (-0.54, -0.28)	-0.35 (-0.45, -0.25)
70	-0.36 (-0.52, -0.21)	-0.44 (-0.50, -0.38)	-0.59 (-0.74, -0.44)	-1.01 (-1.22, -0.79)	-0.97 (-1.11, -0.83)
75	-1.01 (-1.29, -0.72)	-1.16 (-1.26, -1.06)	-1.23 (-1.49, -0.97)	-1.73 (-2.12, -1.35)	-1.73 (-1.97, -1.50)
80	-1.93 (-2.41, -1.45)	-2.25 (-2.42, -2.09)	-3.01 (-3.45, -2.57)	-3.09 (-3.75, -2.43)	-3.46 (-3.83, -3.09)

[a]Estimates are from linear-mixed models with age as the timescale adjusted for practice effects, age at baseline memory assessment, race/ethnicity, Southern birth, childhood socioeconomic status index, educational attainment, and interaction terms for race/ethnicity, Southern birth, childhood socioeconomic status, and educational attainment with time trend splines (Model 4).

Table 3. Estimated mean change in memory scores ages 60-70 (95% CI) by work-family profile and estimated mean differences in change in memory scores ages 60-70 (95% CI) between work-family profile groups[a]

	Mean change (95% CI) in memory scores between ages 60 and 70 years for each lifecourse work-family demand profile	Mean difference in change (95% CI) in memory scores between ages 60 and 70 years between lifecourse work-family demand profile groups
Working non-mother	-0.61 (-0.77, -0.46)	0.08 (-0.08, 0.24)
Working married mother	-0.69 (-0.75, -0.63)	reference
Working single mother	-0.82 (-0.97, -0.66)	-0.13 (-0.28, 0.03)
Non-working single mother	-1.25 (-1.46, -1.03)	-0.55 (-0.77, -0.34)
Non-working married mother	-1.09 (-1.23, -0.94)	-0.39 (-0.54, -0.25)

[a]Estimates are from linear-mixed models with age as the timescale adjusted for practice effects, age at baseline memory assessment, race/ethnicity, Southern birth, childhood socioeconomic status index, educational attainment, and interaction terms for race/ethnicity, Southern birth, childhood socioeconomic status, and educational attainment with time trend splines (Model 4).

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