

# The Healthy Caregiver? A Positive Impact of Informal Caregiving Status on Cognitive Functions Over Time From the Midlife in the United States Study

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## Abstract

**Objectives:** The current study examined whether informal caregivers performed worse, better, or similar to non-caregivers on cognitive tests of executive functioning and episodic memory over 10 years. **Methods:** Data were from waves 2 (2003–04) and 3 (2013–14) of the Midlife in the United States (MIDUS) study ( $N = 2086$ ). Multiple linear regression models examined whether caregiving at both waves 2 and 3 predicted better cognitive functioning at wave 3, than caregiving at only one time point or no caregiving (reference) while controlling for baseline covariates (i.e., sociodemographic, health, and functional status). **Results:** After controlling for covariates, caregiving at both waves was independently associated with better performance in episodic memory ( $b = .24$ ,  $SE = .10$ ,  $p = .013$ ) but not executive function ( $b = -.06$ ,  $SE = .05$ ,  $p = .246$ ). **Discussion:** The findings partially supported both healthy caregiver and stress process models, indicating caregiving may be associated with better episodic memory but not executive functioning over time among the middle-aged and older adults.

## Keywords

Midlife in the United States, family caregiver, cognitive functioning, well-being, quality of life

## Introduction

Family caregiving roles bring stress to individuals providing care (Cheng et al., 2020; Collins & Kishita, 2019; Schulz & Sherwood, 2008). Progressive stress on caregivers may negatively affect their physical, psychological, and social well-being (Allen et al., 2017; Shani et al., 2021). Along with physical and psychological strain, the unpredictable nature of caregiving brings secondary stress in other aspects of life, such as maintaining social relationships (Schulz & Sherwood, 2008). In addition, chronic disease burden not only affects physical and mental health of care recipients but also impacts caregivers' quality of life, resulting in outcomes that include insomnia, depression, and social isolation (Pinquart & Sörensen, 2007; Shani et al., 2021). Reciprocally, caregivers' reduced quality of life may lead to lower quality of life for care recipients (Bhattacharyya et al., 2023; Shani et al., 2021).

Conversely, there are documented benefits of informal caregiving. In terms of practical outcomes, caring for a loved one at home helps to avoid higher cost of institutionalized care (Harris-Kojetin et al., 2016). Compared

to institutionalized care, family caregiving is associated with higher quality of care and more person-centered care for the care recipient (Parmar et al., 2022), while promoting aging in place (Fields et al., 2021). Additionally, caregiving has noted psychological benefits for the caregiver; Piercy and colleagues (2013) identified that the prevalence of dementia caregiver depressive symptoms was significantly lower in a population-based sample than in clinical samples, indicating that the elevated levels of depressive symptoms reported in caregiver studies may be, in part,

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explained by sampling bias. Some studies identify better physical and cognitive health in caregivers than non-caregiver counterparts (Bertrand et al., 2012). Thus, among family caregivers, while caregiving is challenging and associated with higher stress and poorer health outcomes, studies have also shown positive psychosocial and health benefits through certain psychological characteristics (Cejalvo et al., 2021) or having broader social support networks (Chandola et al., 2007).

Whereas family caregiving has been associated with compromised health and well-being for caregivers, how it relates to cognitive health is less examined. Despite of a general trend of cognitive decline in late life (Harada et al., 2013; Salthouse, 2019; Yang et al., 2023; Zhang et al., 2022), including concentration, attention and processing speed, visual and verbal memory, some aspects of language, executive function, and spatial and/or psychomotor ability (Yang et al., 2020), age-related cognitive decline is not consistent across cognitive tasks including tasks of attention and executive function: some older adults decline, but others improve (Verissimo et al., 2022).

Similarly, earlier research has reported contradictory findings regarding caregivers' cognitive functioning over time. Several studies have found that caregivers' cognitive performance became significantly worse than non-caregivers (Corrêa et al., 2015; Falzarano & Siedlecki, 2021; Mallya & Fiocco, 2018), supporting the stress process model that chronic stress has a deleterious impact on cognitive performances (Bertrand et al., 2012). Relatedly, using longitudinal data from the Health and Retirement Study, Dassel and colleagues (2017) found an accelerated decline in global cognitive function for dementia caregivers compared with non-dementia caregivers. Vitaliano and colleagues also found detrimental effect of caregiving stress on spousal caregivers of dementia patients compared to demographically similar non-caregiver spouses (Vitaliano et al., 2011).

However, impaired cognitive performance in caregivers is not always evident. For instance, a study by Pertl and colleagues (2015) found no differences in performance among 179 spousal dementia caregivers on 11 cognitive tasks compared to their 179 non-caregiving counterparts. Furthermore, O'Sullivan and colleagues (2019) found that the performance of 252 spousal caregivers and non-caregivers did not differ on tests examining immediate and delayed memories; instead, the caregivers performed significantly better than non-caregivers on tests for reaction time, processing speed, and free recall. Although caregiving time and effort are crucial factors for caregiver burden (Gülke & Pötter-Nerger, 2022), there are possible positive impacts of caregiving that may explain better cognitive performances among caregivers (Jütten et al., 2020). For example, older women engaged in intense caregiving tasks showed greater physical functioning than low-intensity caregivers and non-caregivers (Fredman et al., 2009). Thus, as an alternative to the stress process model, the healthy caregiver hypothesis

posits that older adult caregivers reflect better physical and cognitive health outcomes than their non-caregiver counterparts (Bertrand et al., 2012). The healthy caregiver hypothesis focuses on the qualitative differences of caregivers from non-caregivers, namely, caregivers are healthier because they must be so to take on the physically and cognitively demanding caregiving responsibilities. This framework argues that many healthy older adults who become caregivers continue to play that role, which helps them maintain good physical and cognitive health, buffering the adverse effects of caregiving burdens, such as stress (Fredman et al., 2008).

Given the divergence between the stress process model and the healthy caregiver hypothesis, we examined the effect of caregiving on two validated domains of cognitive functioning assessed via executive function and episodic memory that are important to caregiving tasks among individuals who were caregivers versus non-caregivers. Episodic memory consists of individuals' recollection of personal experiences specific to time and place; episodic memory may decline throughout life (Harada et al., 2013). In comparison, executive functions consist of cognitive abilities such as planning, organizing, reasoning, and problem-solving (Smith et al., 2014); many of these are associated with age-related cognitive decline. We used data from a nationally representative sample of middle-aged and older adults in the Midlife in the United States (MIDUS) study while controlling for well-documented correlates of caregiving outcomes, including sociodemographic factors, health, and cognitive functions at baseline.

Based on the stress process theory, the expectation would be to find poorer cognitive function over time among caregivers than non-caregivers. Whereas, the healthy caregiver hypothesis would dictate higher and stable cognitive outcomes among caregivers in comparison to non-caregivers over time. However, in all likelihood both dynamics may be present simultaneously but one may offset or even dominate over the other such that caregivers' cognitive outcomes may be contingent upon the interplay between the two processes (Veazie, 2006). Empirical findings from our analysis will therefore clarify which theoretical framework can better explain aggregate cognitive outcomes among middle-aged and older adult caregivers using the longitudinal data from MIDUS.

## Methods

### Data and Sample

Data were from the MIDUS survey, a large-scale longitudinal study spanning 20 years. MIDUS was initiated in 1995–1996 (wave 1), with 7108 English-speaking participants (age range: 24–75 years) recruited through random digit dialing of US households in the 48 contiguous states (Elliot et al., 2018). Wave 2 of this longitudinal study was conducted during 2004–05 with 4963 participants

(75% of the original respondents in wave 1), whereas wave 3 was conducted in 2013–14 with 3294 participants (including 77% of wave 2 participants) (Hughes et al., 2018). All waves of MIDUS datasets contain primary data collected directly from participants. Wave 1 is excluded from our analyses because cognitive performance data was not collected in this wave. No Institutional Review Board (IRB) approval was necessary for this study since MIDUS datasets are publicly available through the Inter-University Consortium for Political and Social Research (ICPSR).

The current study included data from cognitive executive function and episodic memory tests from 2086 individuals who participated in waves 2 and 3 (2004–2014) of MIDUS. Both waves 2 and 3 were conducted through the phone and mailed self-administered questionnaire (SAQ).

### Measures and Procedure

**Dependent Variables.** Both episodic memory and executive function were assessed at waves 2 and 3 with the Brief Test of Adult Cognition by Telephone (BTACT) (Lachman & Tun, 2008). Episodic memory was measured with two tests (immediate and delayed free recall of 15 words). Executive function was measured by inductive reasoning (measured by number series completion), category verbal fluency (measured by verbal ability and fluency in 60 seconds), working memory span (measured by backward digit span), processing speed (measured by 30-Second and Counting Task, or 30-SACT), and attention switching and inhibitory control (measured by Stop and Go Switch Task, or SGST, calculating reaction times) (Lachman et al., 2014). The 2-factor structure of cognitive outcomes in MIDUS has been validated by Lachman and colleagues (2014). The cognitive test scores were standardized by converting into z-scores (Mean [M] = 0; Standard Deviation [SD] = 1) using the M and SD of the wave 2 full sample. Composite scores for both episodic memory and executive function as the mean of the z-scored measures were calculated based on recommendation (Lachman et al., 2010).

**Key Independent Variable.** We used caregiving status as the key independent variable. Participants answered the question: “During the last 12 months have you, yourself, GIVEN personal care for a period of one month or more to a family member or friend because of a physical or mental condition, illness, or disability?” The response was recorded in MIDUS as a binary (0 = no, 1 = yes) variable. For this study, we constructed the outcome as a four-level caregiving status variable using caregiving status across waves 2 and 3: no caregiving either at wave 2 or wave 3 (reference) coded with a [0], caregiving at wave 2 only [ = 1], caregiving at wave 3 only [ = 2], and consistent caregiving at waves 2 and 3 [ = 3].

**Covariates.** We considered sociodemographic factors, health and functional status, and cognitive functions at wave 2 as covariates. Sociodemographic variables included age (6 categories; 1 = <35, 2 = 35–44, 3 = 45–54, 4 = 55–64, 5 = 65–74, 6 = ≥75), gender (1 = male, 2 = female), race (1 = White, 2 = Black/African American, 3 = Native American, 4 = Asian, 5 = others), ethnicity (1 = Not Hispanic, 2 = Hispanic), marital status (1 = married, 2 = separated/divorced, 3 = widowed, 4 = never married), education (1 = no/some school, 2 = high school graduate/in college, 3 = graduated from college, 4 = having master’s/professional degree), and employment (1 = currently working, 2 = self-employed, 3 = retired, 4 = unemployed, 5 = other).

Several variables informed health and functional status. First, participants rated their current physical and mental health status on a five-point scale ranging from 1 (excellent) to 5 (poor). We tallied responses to the physical and mental health questions and included the composite scores (sum) as continuous variables (separately for self-rated physical and mental health domains) in our analyses. Next, participants were asked, using a functional status questionnaire, whether they had difficulty (i.e., functional limitations) in activities of daily living (ADL) and instrumental activities of daily living (IADL). We computed the sum using responses in MIDUS on functional limitations (range: from “a lot” to “no difficulty”) with higher values indicating greater difficulties. We included other variables related to health—body mass index (BMI; 1 = underweight [ $<18.5$ ], 2 = normal [ $18.5–24.9$ ], 3 = overweight [ $>24.9–29.9$ ], and 4 = obese [ $>29.9$ ]), tobacco and alcohol use (1 = regular tobacco/alcohol user, or 0 = not), and composite score obtained by summing binary responses (1 = yes, 0 = no) from seven chronic conditions (high blood pressure, stroke, heart problems, diabetes, cancer, aches/joint stiffness, and sleep problem within past 12 months). Lastly, we considered depressive symptoms that lasted more than two weeks in the past 12 months based on a mean score of a 7-item DEPCON scale that was administered by telephone (Cutler & Lleras-Muney, 2010).

### Statistical Analysis

Statistical analyses were conducted with Stata 17.0 SE (College Station, TX) software. Preliminary analyses examined caregiving characteristics and compared sample demographics for caregivers versus non-caregivers at baseline (wave 2). We then conducted multiple linear regression analyses to examine whether caregiving status over the long-term across waves 2 and 3 or intermittently in wave 2 or in wave 3 were associated with levels of executive functioning and episodic memory at wave 3, compared to non-caregiving status in both waves. The two cognitive outcome measures, episodic memory and executive function, were examined in separate regression models. We first fit zero-order models without any covariates and then added in all covariates measured at baseline that included sociodemographic factors,

health and functional status, and cognitive executive function and episodic memory at wave 2. In addition to examining the main effect of caregiving status, we also explored whether caregiving status moderated the association between baseline and wave 3 episodic memory and executive function by adding the interaction terms in the models. Statistical significance was evaluated at  $p < .05$  (two-sided). Unstandardized regression coefficients ( $b$ ) and standard errors ( $SEs$ ) are reported. We also adjusted the standard errors for repeated observations over time with bootstrapping.

## Results

Table 1 shows the descriptive findings on the dependent and independent variables, including sociodemographic variables and health and functional status at wave 2 for the entire sample and sample stratified by caregiving status. A total of 2086 individuals who completed both wave 2 and wave 3 of MIDUS were included in the analysis. This participant cohort was aged 33–83 years ( $M = 55$ ,  $SD = 11$ ) in wave 2 (i.e., 42–92 years [ $M = 64$ ,  $SD = 11$ ] in wave 3). Overall, 468 (22.4%) participants reported that they were an informal caregiver in the past 12 months in one or both waves, including 10% in wave 2, 9% in wave 3, and 4% in both. In contrast, 77.6% never played role as a caregiver over waves 2–3. Women comprised 56% of the sample, 57% were employed, and 94% were White. Substantial proportions of participants were overweight (39%) or obese (26%), and 77% of the sample had at least one or more chronic health conditions. Further, a higher proportion of informal caregivers were women (caregiving at both waves = 81% vs. 56% in the entire sample) and tobacco users (mean score: caregiving at both waves = 22% vs. 13% in the entire sample). Those who engaged in caregiving scored higher in episodic memory (mean score: caregiving at both waves = .36 vs. .15 in the entire sample) but lower in executive function (mean score: caregiving at both waves = .16 vs. .22 in the entire sample).

The zero-order models (Table 2) examining associations of caregiving status at waves 2 and 3 on wave 3 cognitive episodic memory and executive function suggested that consistent caregiving at both waves 2 and 3 was independently associated with better performance in episodic memory ( $b = .26$ ,  $SE = .09$ ,  $p = .004$ ). The same effect was however not found for executive function ( $b = -.09$ ,  $SE = .05$ ,  $p = .085$ ).

Table 3 shows the parameter estimates from the multiple linear regression models estimating the effect of caregiving status at waves 2 and 3 on wave 3 episodic memory and executive function, respectively, after controlling for covariates. Consistent caregiving at waves 2 and 3 was independently associated with a better performance in episodic memory only ( $b = .24$ ,  $SE = .10$ ,  $p = .013$ ), than with no caregiving at all. However, the association was not significant for executive function ( $b = -.06$ ,  $SE = .05$ ,  $p = .246$ ). Among covariates, women and participants with the highest levels of

education showed an improved performance in episodic memory. In contrast, participants who were 65+ years old and African Americans showed a decline in episodic memory. On the other hand, participants who were 55+ years old, African Americans, separated/divorced and widowed, those who were self-employed, retired or had other (e.g., student) occupational status (relative to working), underweight, and tobacco users showed greater decline in executive function.

Further, the moderation analyses yielded similar findings as our main-effect models that consistent caregiving was associated with better episodic memory; however, caregiving did not moderate the association in cognitive functioning across waves (see Supplementary Table 1). Finally, we conducted a sensitivity analysis by re-running the sample on a revised sample ( $n = 1875$ ). Specifically, we excluded participants who were caregivers at wave 2 only and found similar results that consistent caregiving was associated with better episodic memory (see Supplementary Table 2).

## Discussion

Caregiving seemed to be positively associated with some cognitive abilities over a 10-year period in middle-aged and older adults based on longitudinal data from the MIDUS study. Although participants showed decline in both of the tested cognitive domains, in partial support of the healthy caregiver hypothesis, consistent caregiving across waves was associated with better absolute episodic memory scores than non-caregiving at all. Better performance on episodic memory is particularly important because impaired episodic memory is a core feature of Alzheimer's disease and mild cognitive impairment (Sexton et al., 2010). This finding conflicts with a body of prior research suggesting that caregiver's cognitive performance (e.g., episodic memory and executive function) is poorer than non-caregivers (Corrêa et al., 2015; Falzarano & Siedlecki, 2021; Mallya & Fiocco, 2018). Although the current findings revealed no significant differences in consistent and episodic caregivers compared to non-caregivers in executive functioning, the findings showed a higher percentage of depressive symptoms among consistent caregivers in comparison with other caregiving status, lending partial support for the stress process model in that caregiving demands may build up over time making caregivers vulnerable to poorer mental health.

The above finding on caregivers' better episodic memory performance contributes to growing literature highlighting that engagement in caregiving tasks may be associated with some benefits in cognitive functioning (Jütten et al., 2020; O'Sullivan et al., 2019; Veal et al., 2022). Possible explanations may include the following: first, caregiving necessitates engagement in some cognitively demanding responsibilities, such as managing medications and decision making; second, it is associated with higher physical activities and a sense of purpose in life. Research demonstrates how complicated these issues are and the multiple processes

**Table 1.** Comparison of Respondent Characteristics of US Adults in MIDUS Wave 2 (n = 2086).

Variables	Caregiving status					P-value
	Overall (n = 2086)	Neither (n = 1618; 77.6%)	W2 only (n = 211; 10.1%)	W3 only (n = 184; 8.8%)	Both (n = 73; 3.5%)	
Age in year M (SD)	55.1 (10.9)	54.9 (11.2)	55.9 (10.1)	55.3 (10.1)	54.9 (9.6)	.755
<35 (%)	1.0	1.0	0.9	0.5	2.7	
35–44 (%)	18.0	19.1	14.2	15.2	9.6	
45–54 (%)	30.2	29.2	30.3	34.8	37	
55–64 (%)	29.4	28.7	33.6	30.4	30.1	
65–74 (%)	17.0	17.2	18.0	14.1	17.8	
≥75 (%)	4.4	4.6	2.8	4.9	2.7	
Women (%)	55.7	52.5	62.6	66.3	80.8	<b>&lt;.001</b>
Race (%)						.455
White	93.9	94.5	91.9	92.4	90.4	
African American	2.3	2.2	3.3	1.6	2.7	
Native American	1.2	1.1	1.4	1.6	2.7	
Asian	0.5	0.5	0.0	1.1	0.0	
Others	2.1	1.7	3.3	3.3	4.1	
Ethnicity						<b>.034</b>
Not Hispanic	97.3	97.8	95.3	95.1	98.6	
Hispanic	2.7	2.2	4.7	4.9	1.4	
Marital status (%)						.107
Married	73.6	74.4	66.8	75.5	71.2	
Separated/divorced	13.2	13.1	14.2	12.5	15.1	
Widowed	5.5	5.4	9.5	2.2	5.5	
Unmarried	7.6	7.1	9.5	9.8	8.2	
Education (%)						.776
No/some school	3.9	3.7	4.3	6.0	2.7	
Graduated from school	44.2	44.3	44.8	42.4	43.8	
Graduated from college	33.4	33.8	31.0	30.4	38.4	
Master's/prof. degree	18.5	18.2	20.0	21.2	15.1	
Employment (%)						.180
Working	57.4	58.1	53.8	59.6	46.6	
Self-employed	12.1	12.0	10.0	11.5	20.6	
Retired	2.0	1.6	4.3	2.2	2.7	
Unemployed	20.5	20.5	22.4	18.0	21.9	
Other	8.0	7.7	9.5	8.7	8.2	
Health and functional status						
BMI (%)						.381
Underweight	0.7	0.7	0.5	0.4	1.4	
Normal	30.4	30.5	31.3	31.5	23.3	
Overweight	38.7	39.7	33.2	37.0	35.6	
Obese	26.4	25.2	33.2	27.7	31.5	
Missing	3.7	3.8	1.9	3.3	8.2	
Tobacco-user (%)	12.9	12.4	10.4	16.3	21.9	<b>.034</b>
Alcohol-user (%)	37.6	38.9	34.6	34.2	26.0	.067
SR physical health M (SD)	2.3 (.9)	2.7 (.9)	2.3 (1.0)	2.2 (.9)	2.3 (.8)	.541
SR mental health M (SD)	2.0 (.9)	2.0 (.9)	2.1 (.9)	2.0 (.8)	2.3 (0.9)	.708
Difficulty in ADL M (SD)	1.2 (.5)	1.2 (.5)	1.3 (.5)	1.2 (.4)	1.2 (.4)	<b>.002</b>
Difficulty in IADL M (SD)	1.7 (.8)	1.6 (.8)	1.8 (.8)	1.7 (.8)	1.8 (.8)	.254

(continued)

**Table 1. (continued)**

Variables	Caregiving status					P-value
	Overall (n = 2086)	Neither (n = 1618; 77.6%)	W2 only (n = 211; 10.1%)	W3 only (n = 184; 8.8%)	Both (n = 73; 3.5%)	
Chronic condition/s M (SD)	2.2 (2.3)	2.1 (2.2)	2.6 (2.9)	2.3 (2.0)	2.9 (2.6)	<b>.008</b>
Had sleep problem (%)	9.6	9.2	11.4	8.7	16.4	.162
Depressed >2 weeks (%)	17.7	15.9	25.1	15.2	42.5	<b>&lt;.001</b>
Episodic memory M (SD)	.15 (1.0)	.14 (.9)	.22 (1.0)	.17 (1.0)	.36 (1.1)	<b>.002</b>
Executive function M (SD)	.22 (.9)	.23 (.9)	.11 (.9)	.26 (.8)	.16 (.9)	.263

Note. Values are in column percentage or in mean and standard deviation; BMI = body mass index; SR = self-rated; ADL = activities of daily living; IADL = instrumental activities of daily living; W2 = wave 2; W3 = wave 3. Significance (*p*) from one-way between-subjects analysis of variance (ANOVA) for age and Chi-squared tests of independence for all categorical variables. Bold significant *p*-values.

**Table 2. Zero-Order Multiple Linear Regression Model to Estimate the Effect of Caregiving Status (Waves 2 and 3) on the Cognitive Episodic Memory and Executive Function (wave 3) (n = 2086).**

Variable	W3 Executive function			W3 Episodic memory		
	<i>b</i>	SE ( <i>bt</i> )	<i>p</i> -Value	<i>b</i>	SE ( <i>bt</i> )	<i>p</i> -Value
Intercept	-.23	.01	<b>&lt;.001***</b>	-.07	.02	<b>.002***</b>
Focal predictors						
Caregiving history (ref. neither)						
W2 only	-.03	.03	.427	.04	.06	.507
W3 only	.03	.03	.326	.01	.06	.923
Both	-.09	.05	.085	.26	.09	<b>.004*</b>
Executive function, W2	.59	.01	<b>&lt;.001***</b>	—	—	—
Episodic memory, W2	—	—	—	.54	.02	<b>&lt;.001***</b>
R <sup>2</sup>	.57			.28		
Adjusted R <sup>2</sup>	.57			.28		

Note. W2 = wave 2; W3 = wave 3; *b* = unstandardized regression coefficient; SE (*bt*) = standard error (bootstrapped). Bold significant *p*-values.  
\**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

that undergird different cognitive domains. For example, Shaw and Hosseini (2021) note that episodic memory is a particularly sensitive barometer of cognitive changes related to Alzheimer's disease, and in accordance with the use/disuse hypothesis, continued use of this cognitive domain through practice (especially in the normative aging process) may be beneficial in staving off age-related decline. The authors also found that despite executive control processes being "less adaptable," those with lower cognitive functioning improved the most with cognitive training indicating that concerted training may be helpful in improving executive functioning as well. The authors concluded that there may need to be diverse skill-specific caregiving training programs to address impairments in different cognitive domains. Particular to our findings, we suggest that caregiving functions as a type of episodic memory cognitive training that enhances cognitive reserve but perhaps does not yield the concentrated

practice of particular cognitive skills needed to maintain executive functioning.

Around 80% of the caregivers in our sample are <65 years of age. In prior research, Bertrand and colleagues (2012) found that continuous caregivers (mean age 83 years) had better memory performance and processing speed than continuous non-caregivers over time. Therefore, our finding that consistent caregiving is associated with better episodic memory functions at least partially corroborates earlier research with a different age cohort. However, Vitaliano and colleagues (2011) found that continuous exposure to stress due to caregiving may lead to depression, which over time is associated with lower executive functioning (mean age 72 years). This latter finding may provide a reason why our study (even with lower age cohort) did not yield the expected finding regarding executive function scores, considering that a much higher number of individuals in the consistent

**Table 3.** Multiple Linear Regression Models Predicting Episodic Memory and Executive Function in Mid and Later Life, Controlling for Levels 10 Years Prior,  $n = 2086$ .

Variable	W3 Executive function			W3 Episodic memory		
	<i>b</i>	SE ( <i>bt</i> )	<i>p</i> -value	<i>b</i>	SE ( <i>bt</i> )	<i>p</i> -Value
Intercept	.08	.10	.462	.03	.17	.855
Focal predictors						
Caregiving history ( <i>ref. neither</i> )						
W2 only	-.02	.03	.499	.04	.06	.545
W3 only	.03	.03	.305	-.04	.06	.533
Both	-.06	.05	.246	.24	.10	<b>.013*</b>
Executive function, W2	.50	.01	<b>&lt;.001***</b>	-	-	-
Episodic memory, W2	-	-	-	.42	.02	<b>&lt;.001***</b>
Covariates at W2						
Age ( <i>ref. &lt;35</i> )						
35-44	-.03	.09	.690	.10	.14	.444
45-54	-.10	.09	.225	.02	.13	.883
55-64	-.22	.09	<b>.012*</b>	-.15	.14	.266
65-74	-.40	.09	<b>&lt;.001***</b>	-.50	.14	<b>.001**</b>
≥75	-.53	.10	<b>&lt;.001***</b>	-.85	.16	<b>&lt;.001***</b>
Female ( <i>ref. male</i> )	-.02	.02	.314	.34	.04	<b>&lt;.001***</b>
Race ( <i>ref. White</i> )						
African American	-.17	.06	<b>.008**</b>	-.39	.10	<b>&lt;.001**</b>
Native American	.03	.07	.694	-.03	.19	.891
Asian	-.09	.14	.516	-.02	.41	.963
Other	-.06	.07	.366	-.15	.13	.241
Ethnicity ( <i>ref. not Hispanic</i> )						
Hispanic	.01	.06	.921	-.03	.13	.832
Marital status ( <i>ref. married</i> )						
Separated/divorced	-.04	.03	.226	-.07	.06	.175
Widowed	-.08	.07	.227	.16	.09	.069
Never married	-.03	.04	.382	.04	.06	.519
Education ( <i>ref. no/some school</i> )						
Graduated school/in college	.02	.04	.669	.08	.08	.305
Graduated from college	.07	.05	.116	.14	.08	.108
Master's/professional degree	.10	.05	<b>.034*</b>	.21	.09	<b>.019</b>
Employment ( <i>ref. working</i> )						
Self-employed	-.10	.03	<b>.002**</b>	-.07	.06	.203
Retired	-.12	.03	<b>&lt;.001***</b>	-.02	.06	.674
Unemployed	-.10	.07	.127	-.16	.12	.167
Other	-.08	.04	<b>.028*</b>	.00	.07	.983
BMI ( <i>ref. normal</i> )						
Underweight	-.28	.12	<b>.021*</b>	-.15	.20	.466
Overweight	-.01	.02	.638	.03	.04	.456
Obese	-.01	.03	.723	.03	.05	.517
Missing	-.05	.06	.429	.01	.09	.950
Tobacco user	-.06	.03	.062	-.08	.05	.154
Alcohol user	.00	.02	.847	-.03	.04	.464
SR physical health	.00	.01	.829	.02	.03	.547
SR mental health	-.01	.01	.341	-.06	.03	<b>.030*</b>
Difficulty in ADL	-.02	.04	.507	-.06	.06	.255
Difficulty in IADL	.01	.03	.631	-.02	.04	.541
Chronic conditions	-.01	.01	.260	-.01	.01	.593
Felt sad/depressed	.01	.03	.638	-.08	.05	.123
Sleep problem	.00	.04	.988	.08	.07	.271
R <sup>2</sup>	.63			.38		
Adjusted R <sup>2</sup>	.62			.37		

Note. W2 = wave 2; W3 = wave 3; *b* = unstandardized regression coefficient; SE (*bt*) = standard error (bootstrapped); BMI = body mass index; SR = self-rated; ADL = activities of daily living; IADL = instrumental activities of daily living. Bold significant *p*-values. \**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

caregiver category felt depressed than non-caregivers (see Table 1).

Thus, caregiving status may translate to better episodic memory by increasing physical activity and engaging in responsibilities that may reduce stress and increase well-being (Fredman et al., 2009). One possible mechanism for this effect is that engagement in meaningful activities may have a positive effect on the nervous system as a response to stress (Bhattacharyya et al., 2023; Ross & Thomas, 2010). Similar to this mechanism, despite exhausting caregiving responsibilities, caregivers may feel an overall satisfying relationship with the person for whom they are caring (Gülke & Pötter-Nerger, 2022); therefore, some caregiving tasks may also enhance well-being by activating neural circuits that regulate cognitive functions (Allen et al., 2017).

Additionally, although family caregivers experience greater stress than non-caregivers as evidenced through self-reported questionnaires and higher cortisol levels (Allen et al., 2017), some research suggests that excessive stress can be detrimental to cognitive functioning (Marin et al., 2011; Scott et al., 2015), but milder stress may enhance cognitive performance, especially immediate memory functions (Jütten et al., 2020; O'Sullivan et al., 2019). Therefore, possibly, the quality, not the quantity of stress, is a more crucial factor that affects cognitive functioning. In other words, the meaningfulness of caregiving activities may serve as a buffer against the stress of caregiving and perhaps as an avenue for improving episodic memory.

Some demographic differences in our sample should be noted. We found that African American participants showed more decline in both domains of cognitive functions. Interestingly, earlier research found that African American caregivers were less likely than White caregivers to provide continuous care (McCann et al., 2004). Although our sample was predominantly White, we did not find any racial differences in continuous caregiving patterns. However, our study found that the percentage of non-Hispanic participants in consistent caregiving group was slightly higher than that in each of the other caregiving groups, indicating non-Hispanics were slightly more likely to be providing continuous care than non-caregivers, compared to their Hispanic counterparts. Future studies should examine these issues in a racially more diverse sample.

Lastly, while for both outcome measures, the strongest predictor of wave 3 performance was wave 2 performance, the current findings also revealed that the retest correlation was higher for executive function than that for episodic memory, indicating that individual variations in executive function were stable in this sample over 10 years. This finding corroborates earlier literature showing higher retest stability for fluid ability ( $r = .94$ ) and processing speed ( $r = .91$ ) than episodic memory ( $r = .58$ ) in middle-aged adults (Zimprich & Mascherek, 2010).

In the above context, it should also be considered that family caregivers often select themselves on the basis of their better physical and cognitive health and their sense that they can do the job (Roth et al., 2009). Using effective coping

mechanisms for logical analysis, decision making, and problem solving may be related to their higher self-reported health; this self-selection bias could be a potential confounder because it may make them better than non-caregivers in some cognitive dimensions (Roth et al., 2015). Moreover, many caregivers, who are more likely to be healthy and active, may be more likely to volunteer to participate in a research study. Volunteers often differ from nonparticipants in ways related to the research question, and this self-selection could affect the generalizability of our findings.

### Limitations

Although the longitudinal nature and the large sample number are the main strengths of this study, it nonetheless has several limitations. For instance, MIDUS participants were not screened initially for cognitive impairment; therefore, we cannot rule out whether the participants have any neurocognitive disorders in our sample. Another limitation is related to recall bias because responses were collected retrospectively. Omitted variable bias related to caregivers' stress process is also a concern. Furthermore, selection bias is a large concern in the current study—we acknowledge that individuals who can and cannot continue caregiving over a 10-year period likely differ in ways that are systematically associated with the outcomes across the two cognitive domains we examined. However, using MIDUS data, it is not possible to extract whether one provided care continually over the 10-year study-period. Additionally, we could not capture the exact caregiving tasks nor the intensity of caregiving (i.e., worked for two/more care recipients simultaneously) given the nature of secondary data analysis. Although in the regression model we controlled for socio-demographic, health, and some caregiving factors (recipient relationship type and caregiving hours), there may have been other sources of stressors or support that could have affected the outcomes. We did not take into account/control for other major life changes occurring during this time period. Thus, future large-scale surveys, similar to MIDUS, should collect more in-depth information on caregiving tasks.

The MIDUS used only phone and mailed questionnaires, unlike many of the prior studies that used higher quality lab-based measures of cognitive function. Although telephone-based cognitive performance tests have some limitations regarding auditory stimuli and tasks, the MIDUS data provide broader information on health behavior and social engagement, including social support/conflicts (Seeman et al., 2011). Also, the innovative and stringent criteria of BTACT provided enhanced data on executive functions and episodic memories (Lachman et al., 2014). Further, the MIDUS caregiving criteria combined those who may have been a caregiver for someone with an acute event with those caring for others with more chronic illnesses and needs. Future studies should differentiate individuals engaged in caring for care recipients with different medical/cognitive impairments and comorbidities.



Additionally, the racial make-up of the current sample is largely White, and there need to be studies that include a representative number of African Americans, Hispanics, and Asians. The caregiving experience may be different for these other ethnic groups that may affect their cognitive status in unique ways. Finally, information in MIDUS is dated and may not be representative of health and economic conditions facing informal caregivers in current times.

## Conclusions

Overall, our findings expand prior work by examining informal caregivers' cognitive performances over time and showing that consistent caregiving status may have some benefits in maintaining episodic memory among middle-aged and older adults. Despite its complex and burdensome impact on many individuals, caregiving may support cognitive health if individuals practice caregiving tasks as a meaningful engagement to face the growing demand for caregiving. Maintaining caregivers' cognitive functions has important implications. If caregivers' cognitive functions decline, they may become less capable of providing care at home and the care-recipient may need to be shifted to institutional care (e.g., nursing facilities). This shifting of care not only increases burden on the formal health care system, but it can also bring financial and psychosocial burden on the family itself (Fields et al., 2021). Therefore, a greater focus on the potential positive aspects of caregiving (e.g., meaningfulness) could provide guidance regarding how to avoid the negative consequences of consistent caregiving and to promote quality of life among community-living caregiving dyads.

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## Supplemental Material

Supplemental material for this article is available online.

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