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Subjective age and multiple cognitive domains in two longitudinal samples

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ABSTRACT

Objective: Subjective age is consistently related to memory performance and global cognitive function among older adults. The present study examines whether subjective age is prospectively related to specific domains of cognitive function.

Method: Participants were drawn from the Health and Retirement Study (HRS, $N = 2549$, Mean Age = 69.66, SD = 7.36) and the Midlife in the United States Survey (MIDUS, $N = 2499$, Mean Age = 46.24, SD = 11.25). In both samples, subjective age, depressive symptoms, chronic conditions, and demographic factors were assessed at baseline. Four domains of cognition were assessed 8 years later in the HRS and almost 20 years later in the MIDUS: episodic memory, speed-attention-executive, verbal fluency, and numeric reasoning. HRS also assessed visuospatial ability.

Results: Regression analysis revealed that an older subjective age was related to worse performance in the domains of episodic memory and speed-attention-executive in both samples. The effect size for the difference between a younger and an older subjective age was $d = 0.14$ (MIDUS) and $d = 0.24$ (HRS) for episodic memory and $d = 0.25$ (MIDUS) and $d = 0.33$ (HRS) for speed-attention-executive. Feeling older was related to lower verbal fluency in HRS ($d = 0.30$) but not in MIDUS, whereas no association was found with numeric reasoning in either sample. An older subjective age was related to lower visuospatial ability in HRS ($d = 0.25$).

Conclusion: Subjective age is prospectively related to performance in different cognitive domains. The associations between subjective age and both episodic memory and speed-attention-executive functions were replicable and robust over up to 20 years of follow-up.

1. Introduction

Subjective age, which refers to how old or young individuals perceive themselves to be, is consistently related to cognitive function among older adults [1]. Indeed, an older subjective age is related to worse memory performance in large cross-sectional and prospective studies such as the Midlife in the United States (MIDUS) and the Health and Retirement Study (HRS) [2–4] and to steeper memory decline over time in the HRS [3]. Furthermore, research conducted in the HRS indicated that feeling older than one's age is prospectively related to worse cognitive function and greater cognitive decline as reported by a knowledgeable informant [5]. Consistent with these findings, an older subjective age predicts a higher risk of cognitive impairment [6] and incident dementia in the HRS and the National Health and Aging Study (NHATS) [6,7]. Most of this existing research has focused on either memory performance or a global cognitive assessment. Less is known about the association between subjective age and other cognitive domains. Examining a range of cognitive domains provide broader knowledge on how subjective age is related to cognitive functioning. From the current evidence, for example, it is unclear whether the associations between subjective age and memory extend to other domains such as executive function or numeric abilities. Examining differential associations could inform theoretical and clinical models given that different cognitive domains are differentially affected by neurological disorders [8]. To address this gap in the literature, the present study examines whether the association between subjective age and cognitive function extends to multiple cognitive domains.

There are several reasons to expect an association between subjective age and cognition. Indeed, subjective age is related to a range of behavioral, psychological, health-related, and biological factors

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involved in cognitive functioning. Among the behavioral factors, feeling older is related to physical inactivity [9], which is related to functioning across several cognitive domains, such as episodic memory, executive functions, and processing speed [10]. In addition, an older subjective age is related to lower involvement in cognitively enriching leisure time behaviors [11]. Subjective age is also associated with psychological factors, including depressive symptoms [12] and anxiety [13], which impair performance on cognitive tasks [14,15]. Furthermore, feeling older than one's age is related to health-related factors, such as obesity [16], which is associated with increased risk of cognitive impairment and dementia [17]. Finally, biological processes may explain the association between subjective age and cognition. For example, an older subjective age is associated with higher systemic inflammation [18], which is associated with poor performance on attention, executive function, and memory tasks [19].

These replicated, culturally-consistent, and pervasive associations between subjective age and risk (protective) factors inform non-mutually exclusive theoretical perspectives on the association between subjective age and cognitive function in adulthood. According to a *causal* model, subjective age is predictive of a range of cognitive and health outcomes through its influence on these behavioral, psychological, and biological factors [20]. Consistent with this causal model, experimental evidence indicates that individuals perform better on a memory task when induced to feel younger [21].

A second theoretical perspective defines subjective age as a biopsychosocial marker of aging [22]. In this perspective, subjective age is the outcome of psychological, behavioral and biological factors that influence cognition. Therefore, the predictive power of subjective age is due to the tendency to feel older among people who have worse psychological, functional, and health status that may lead to worse cognitive functioning. In this biopsychosocial model, individuals who hold negative beliefs about age and aging are more likely to feel older [23] and perform worse on cognitive tasks [24,25].

A third theoretical model is a vulnerability model, which postulates that an older subjective age amplifies the harmful effects of a range of factors on health and cognition. In this model, subjective age is a moderator of the deleterious health and cognitive effects of other factors. According to this model, how old or young individuals feel reflect their recovery capital, which are the resources to cope with threat [26]. As such, individuals with an older subjective age are more vulnerable to the adverse effects of stress and depression on health-related outcomes because they may lack the psychological, biological and behavioral resources to cope with these threats [26,27]. Furthermore, an older subjective age amplifies the vulnerability to aging stereotypes [28]. This model thus suggests an older subjective age may amplify vulnerability to the negative effects of risk factors of poor cognition, such as stress [29] or negative aging stereotypes [30].

Based upon two large longitudinal cohorts, the present study examined whether subjective age is prospectively related to five cognitive domains: Episodic memory, speed-attention-executive, visuospatial ability, fluency, and numeric reasoning. Episodic memory is the memory for specific events. Speed assesses how fast an individual responds to a stimulus and attention refers to how well one attends to the stimulus. Both speed and attention, as well as cognitive flexibility, are considered components of executive function. Visuospatial ability refers to the ability to mentally manipulate figures in more than one dimension. Fluency is the ability to correctly retrieve words from a specific category, and numeric reasoning is the ability to identify the relation between numbers. It was hypothesized that an older subjective age would be related to worse performance in all five cognitive domains. Additional analyses addressed whether the association between subjective age and the cognitive domains persisted when depressive symptoms and chronic conditions were included as covariates and whether demographic factors, depressive symptoms and chronic conditions moderated the association between subjective age and the five domains.

2. Method

2.1. Participants

Participants were from the Health and Retirement Study (HRS) and the Midlife in the United States Survey (MIDUS). Informed consent was obtained from all participants in both samples. The present study was exempt from Institutional Review Board (IRB) review because it was based on publicly available de-identified datasets. The HRS is a nationally representative longitudinal study of Americans older than 50 years and their spouses. The HRS was approved by the IRB at University of Michigan. Data on subjective age, demographic factors, and global cognition were obtained from half of the participants in 2008 and from the other half in 2010 as part of the HRS regular assessment. Data on cognitive functions were obtained in 2016 from the Harmonized Cognitive Assessment Protocol (HCAP) sub-study. This sub-study includes a subset of HRS participants aged 65 years and older who completed the 2016 core interview and were randomly selected to participate in the HCAP comprehensive battery of cognitive tests. A total of 3496 participants provided data as a part of HCAP. A total of 2549 participants had complete data on subjective age, demographic data, and at least one cognitive domain in HCAP (60% women, Mean age = 69.66, SD = 7.36). Individuals with follow-up data had a younger subjective age (d = 0.11) and were more educated (d = 0.09) than those without follow-up data. There was no difference in age, sex, race, and Hispanic ethnicity.

The MIDUS is a longitudinal study of U.S. adults aged 20–75 years. The MIDUS survey was approved by the Education and Social/Behavioral Sciences and the Health Sciences IRBs at the University of Wisconsin-Madison. Subjective age and demographic factors were assessed at baseline from the first wave (MIDUS I, 1995–1996) among a sample of 6029 individuals. Of this baseline sample, a total of 2499 participants (54% women, Mean age = 46.24, SD = 11.25) had data on at least one cognitive domain at the third wave of MIDUS (MIDUS III, 2013–2014). Individuals with follow-up data were younger (d = 0.09), had a younger subjective age (d = 0.06), were more educated (d = 0.39), and more likely to be white and female than those without follow-up data.

2.2. Subjective age

In HRS, participants were asked to indicate the age they felt (in years) using the following question: "Many people feel older or younger than they actually are. What age do you feel?". In MIDUS, they were asked "What age do you feel most of the time?" A proportional age discrepancy was computed by subtracting chronological age from felt age and then divided by chronological age. A negative value indicated a younger subjective age, whereas a positive value indicated an older subjective age. Individuals with values three standard deviations above or below the mean were considered outliers and excluded from the analyses. Thirty-eight and 26 participants were excluded from the HRS and the MIDUS, respectively.

2.3. Episodic memory

In the HRS, episodic memory was assessed with the CERAD Word List Learning and Recall Task. Participants were asked to read 10 words and to recall as many words from the list as possible (immediate recall). Delayed recall was obtained by asking participants to recall as many words from the list as possible after a delay. Recognition was assessed by showing participants 10 target words and 10 foils, and asking them to indicate which words were on the original list. The Brave Man and the Wechsler Memory Scale Logical Memory were also used to assess episodic memory. In each task, participants read a story passage and reported the main points of the story immediately and after a short delay. A recognition test was included for the Logical Memory task that asked participants to answer 15 questions (yes/no) about the story. Performance on these tasks was standardized and summed to give an episodic memory score.

The Brief Test of Adult Cognition by Telephone (BTACT) [31] was used to assess cognition in the MIDUS. Episodic memory was measured by asking participants to listen to a list of 15 words and then recall as many words as possible both immediately and after a delay of approximately 12 min. Episodic memory was computed by summing the number of correct words for immediate and delayed recall.

2.4. Speed-attention-executive

In HRS, speed-attention-executive was assessed with the Letter Cancellation Test, the backward counting task, the Symbol-Digit Modalities test, and the Trail Making Test Part A and Part B. In the Letter Cancellation Test, participants were given one minute to cross out as many "P" and "W" letters as possible from a large grid of letters. The score was the last letter gotten to at the one-minute mark. The backward count task is a measure of processing speed in which participants count backward from 100 as fast as possible. The score was the count of numbers said in 30 s. In the Symbol-Digit Modalities Test, participants were presented with random geometric figures and a separate key that paired numbers with each figure. They were asked to substitute a number for each figure on the sheet of paper. The number of correct pairings made in 90 s was the score. In the Trail Making Test Part A, participants were given a sheet of numbers in circles on a page and were asked to connect the consecutively numbered circles as fast as possible. In the Trail Making Test part B, participants had to switch between numbers and letters as quickly as possible. For both part A and part B, the score was the time to complete the task. A slower time indicated worse performance. Trails A and B were multiplied by −1 to be consistent with the scoring of the other tasks. Performance on each task was standardized and summed to give an overall speed-attention-executive score.

In MIDUS, the speed-attention-executive domain was assessed using digits backward span task, a Stop and Go Switch task, and a backward count task [31]. In digits backward span, the interviewer read a series of digits to the participant, and the participant had to say the digits back in reverse order. The span length increased from two digits up to eight digits. The score is the number of correct responses. The Stop and Go Switch Task [32] was used to assess choice response time, attention switching, and inhibitory control. The SGST is a reaction time test, which includes two single-task blocks and a mixed task-switching block that required alternating between two tasks. The mean latency of switch and nonswitch trials was used in the present study. Backward couting was measured by asking participants to count backward from 100 in 30 s; the total score is 100 minus the last number reached plus the number of errors. The speed-attention-executive domain was obtained by standardizing and summing the scores for digits backward span, SSGT, and backward count.

2.5. Fluency

In both HRS and MIDUS, a category fluency test was used to assess verbal fluency. Participants were asked to name as many animals as possible in 60 s. The total number of animals named was the fluency score.

2.6. Visuospatial ability

Visuospatial ability was only available in the HRS. The CERAD Constructional Praxis task was used. Participants were asked to copy geometric forms that varied in difficulty both immediately and after a short delay. In addition, the Raven's Standard Progressive Matrices were used. Participants were given geometric pictures with a small section that cut out. Participants were asked to choose the picture that correctly completed the missing piece from a set of smaller pictures. There were 17 items on this version of the Raven's test. Visuospatial ability was obtained by standardizing each task and taking the sum.

2.7. Numeric reasoning

The measure of numeric reasoning was a number series task. Participants were presented with a series of numbers with one or two numbers missing and were asked to identify the missing numbers. There was no time limit. In HRS, participants were given a first block of items and then were assigned to a second block that varied in difficulty depending on how well participants completed the first block.

2.8. Covariates

Age (in years), sex (coded as 1 for men and 0 for women), education (in years), and race were included as covariates in both samples. Hispanic ethnicity was also included in the HRS. In additional analyses, depressive symptoms and chronic conditions were controlled for in both samples. An 8-item version of the Centers for Epidemiologic Study Depression (CES-D) [33] was used in the HRS, and the Composite International Diagnostic Interview Short Form scales (CIDI-SF) [34] was used in the MIDUS. In the two samples, the measure of chronic conditions was the sum of diagnosed diseases and conditions such as high blood pressure, diabetes, cancer, lung disease, heart condition, stroke, osteoporosis, and arthritis.

2.9. Data analysis

Linear regression analysis was used to test the association between subjective age and each cognitive domain. Each cognitive domain was regressed on subjective age, controlling for age, sex, education, and race in both samples. In HRS, Hispanic ethnicity and wave of subjective age assessment (coded as 1 for 2008 and 0 for 2010) were also included as covariates. Additional analyses included depressive symptoms and chronic conditions as additional covariates. We also tested whether any of the associations between subjective age and the cognitive domains were moderated by age, sex, education, and race (and hispanic ethnicity in the HRS), depressive symptoms and chronic conditions with an interaction between subjective age and each covariate.

A sensitivity analysis conducted in the HRS excluded participants with any cognitive impairment at baseline. In these analyses, the modified Telephone Interview for Cognitive Status (TICSm) was used to assess cognitive impairment [35]. A 27-point score was computed by summing the performance on immediate and delayed recall, serial 7 subtraction test, and a backward counting test. Scores lower than 12 indicated cognitive impairment [35]. These cut-offs have been validated against the diagnosis obtained in the Aging, Demographics, and Memory Study (ADAMS) [35]. In particular, the prevalence of CIND and dementia in the HRS estimated using these cut-offs was close to those estimated using neuropsychological assessment of the ADAMS [35]. Individuals with scores lower than 12 were excluded.

3. Results

Descriptive statistics are in Table 1. In line with the hypothesis, subjective age was significantly related to episodic memory and speed-attention-executive in both samples, controlling for demographic covariates (see Tables 2 and 3). This result suggests that an older subjective age is associated with lower performance on measures of episodic memory and speed-attention-executive 8 to 20 years later. An older subjective age was also related to lower fluency and visuospatial ability in the HRS (Table 2) but was unrelated to verbal fluency in the MIDUS (Table 3). Subjective age was not related to numeric reasoning in either sample (Tables 2 and 3). Controlling for covariates, the effect size for the difference between a younger and an older subjective age was $d = 0.14$

Table 1
Descriptive statistics for all study variables.

	HRS	MIDUS
Variable	Mean (SD) or %	Mean (SD) or %
Age (years)	69.66 (7.36)	46.24 (11.25)
Sex (female)	60%	54%
Race (white)	85%	94%
Hispanic (yes)	8%	–
Education	12.94 (2.98)	7.44 (2.45)
Depressive symptoms	1.16 (1.79)	0.63 (1.74)
Chronic conditions	2.05 (1.24)	2.21 (2.24)
Subjective age	−0.16(0.14)	−0.16 (0.15)
Episodic memory	0.38 (5.76)	11.20(4.72)
Speed-attention-executive	0.80(3.39)	0.06(2.12)
Visuospatial ability	0.21 (2.40)	–
Verbal fluency	16.13 (6.53)	18.89(6.04)
Number series	523.90 (30.61)	2.36(1.55)

Note. $N_{HRS} = 2549$; $N_{MIDUS} = 2499$. The analytic *ns* vary for cognition, depressive symptoms and chronic conditions due to missing data. See Method section for differences in the measures between the two samples.

Table 2
Associations between subjective age and cognitive domains in the HRS.

	Episodic memory	Speed-attention-executive	Visuospatial ability	Verbal fluency	Numeric reasoning
Age	−0.37***	−0.42***	−0.32***	−0.32***	−0.23***
Sex	−0.17***	−0.08***	0.03	−0.02	0.09***
Education	0.26***	0.34***	0.35***	0.25***	0.36***
Race	0.14***	0.20***	0.22***	0.17***	0.22***
Hispanic Ethnicity	−0.05*	−0.06***	0.00	0.03	−0.07***
Time elapsed between waves	−0.09***	−0.09***	−0.08***	−0.08***	−0.06**
Subjective age	−0.07***	−0.08***	−0.05**	−0.07***	−0.02
Sample size	2472	2138	2501	2549	2184

Note. Coefficients are standardized beta coefficients from linear regression. *$p < .05$, **$p < .01$, ***$p < .001$.

Table 3
Associations between subjective age and cognitive domains in the MIDUS.

	Episodic memory	Speed-attention-executive	Verbal fluency	Numeric reasoning
Age	−0.36***	−0.37***	−0.36***	−0.33***
Sex	−0.28***	0.08***	−0.01	0.10***
Education	0.19***	0.22***	0.25***	0.34***
Race	0.07***	0.11***	0.09***	0.11***
Subjective age	−0.07***	−0.07***	−0.03	−0.02
Sample size	2369	2380	2496	2435

Note. Coefficients are standardized beta coefficients from linear regression. *$p < .05$, **$p < .01$, ***$p < .001$.

in the MIDUS and d = 0.24 in HRS for episodic memory and d = 0.25 in the MIDUS and d = 0.33 in the HRS for speed-attention-executive. In the HRS, effect sizes for the difference between feeling younger and feeling older were d = 0.30 for verbal fluency and d= . 25 for visuospatial ability.

The overall pattern was similar when depressive symptoms and chronic conditions were included as covariates in both samples, except that the association between subjective age and visuospatial ability was reduced to non significance in the HRS (β = −0.03, p = .10; see supplementary Tables 1 and 2).

There was little evidence for an interaction between subjective age and demographic factors or depressive symptoms and chronic conditions in either sample. Among a total of 35 interactions tested in the HRS and 24 interactions tested in the MIDUS, an older subjective age was more strongly related to lower episodic memory among older individuals in the HRS (β = −0.04, p = .02) and higher reasoning among those more educated in the MIDUS (β = 0.04, p = .03). The relationship between an older subjective age and lower episodic memory (β = 0.04, p = .01) and speed-attention-executive function (β = 0.05, p = .002) was slightly stronger among individuals with lower depressive symptoms in the HRS. The remaining 55 interactions were not significant. Overall, the sporadic significant interactions did not replicate across samples or cognitive domains and are likely to be chance findings.

Finally, in the HRS, the sensitivity analysis that excluded participants with cognitive impairment (N = 353) indicated that an older subjective age remained related to lower episodic memory (β = −0.06, p = .003), speed-attention-executive (β = −0.07, p < .001), verbal fluency (β = −0.04, p = .03), and visuospatial ability (β = −0.04, p = .03). This finding suggested that the associations were not due solely to individuals with cognitive impairment.

4. Discussion

Based upon two large U.S. samples of middle-aged and older adults, the present study examined the prospective association between subjective age and multiple cognitive functions 8 to 20 years later. In both samples, an older subjective age was related to lower performance in the memory and the speed-attention-executive domains but was unrelated to numeric reasoning. In addition, feeling older was associated with lower verbal fluency and visuospatial ability in the HRS. Out of four cognitive domains, the association between subjective age and cognition did not replicate for only one function (e.g. fluency) and did replicate for crucial domains such as memory and speed-attention-executive. Therefore, this study support the role of subjective age for cognition in adulthood. These associations were independent of demographic factors and remained significant after accounting for measures of chronic conditions and depressive symptoms (except for the association with visuospatial ability). The mostly null interaction effects between subjective age and covariates suggest that the associations were similar across demographic and health-status groups. A sensitivity analysis also indicated that the effects were not driven by participants with cognitive impairment. This study expands existing research on the link between subjective age and cognition [1–3] in at least two important ways. First, it provides a more detailed account of the association between subjective age and specific cognitive domains. Second, it shows that subjective age predicts cognitive function up to twenty years later, one of the longest follow-up periods yet examined. In longitudinal studies, associations are generally attenuated with increasing time between assessments. The loss of predictive power over time is due to changes in life circumstances, health conditions, and numerous idiosyncratic factors. It is therefore remarkable that the associations remained significant over an interval of 20 years.

There are multiple mechanisms that may explain why subjective age is related to cognitive functions. In particular, subjective age is related to a range of behavioral, psychological, and biomedical factors implicated in cognition. For example, feeling older than one's age is associated with physical inactivity [9], higher depressive symptoms and anxiety [13], lower IQ [36], lower openness to experience [23], poor self-rated cognition [37], higher BMI [16], and biological dysfunction [18] that are known to contribute to lower cognitive functioning in different domains [10,14,15,17,19,38,39]. Also, recent research found an association between an older subjective age and the faster aging of brain structures [40], which may impact cognitive function. An older subjective age is also related to a higher risk of cardiovascular disease over time [41] that may lower cognitive performance [42]. Consistent with this literature, the current study revealed that depressive symptoms and chronic conditions partially accounted for the link between subjective age and cognitive functions. Finally, the association between subjective age and cognition could be explained in part by aging stereotypes. Specifically, according to the model of age-stereotype internalization and dissociation (SIDI) [43], an older subjective age reflects the internalization of negative age stereotypes, and these stereotypes have been related to worse cognitive performances [30].

The findings from the current study are consistent with both the causal and biopsychosocial marker of aging models listed in the introduction. Subjective age may also be sensitive to non pathological, undiagnosed factors that may convert into poorer cognitive functions. In contrast, the current study provided little support for a vulnerability model in which an older subjective age amplifies the effect of other risk factors on life outcomes. Indeed, there was no replicable evidence across samples that feeling older interacted with depressive symptoms or chronic conditions in predicting performance in the cognitive domains.

Cognitive functions are pluridetermined, with factors ranging from genetics [44] to the environment [45]. The present study's findings, combined with existing evidence [1], strengthen the addition of subjective age to the list of factors related to cognitive function in adulthood. The present findings indicate that the contribution of subjective age on cognition is not domain-specific and extends across different functions, but not all. Furthermore, subjective age is related to performance on single measures of basic cognitive functions (e.g., memory) and more complex cognitive functions that require the integration of several cognitive processes (e.g., speed-attention-executive). The link between subjective age and verbal fluency was observed over 8 years in the HRS but seemed to dissipate over longer periods, as indicated by the lack of association over the 20-year follow-up in the MIDUS, and the association between feeling older and lower visuospatial ability was fully accounted by depressive symptoms. Finally, subjective age was unrelated to reasoning in both samples. Of note, longitudinal data indicate that performance on memory and speed tasks start to decline approximately one decade earlier than performance on reasoning tasks [46]. As such, memory and speed may be more vulnerable to feeling older than one's age than reasoning tasks. In addition, performance on numeric reasoning may also include an element of education and experience with numbers that has less to do with age than for the other cognitive domains. As a whole, the unfavorable behavioral, affective and health-related profile of individuals with an older subjective age may be more threatening for verbal reasoning than for numeric reasoning. For example, feeling older is related to a lower involvement in stimulating cognitive activities, such as internet use [11], which implies the manipulation of concepts and words, more than the use of numbers.

This study extends existing models on the relationship between subjective age and health [20] to cognitive function in adulthood. Furthermore, it informs existing knowledge on the association between subjective age and cognitive impairment and dementia [6,7]. Indeed, it is likely that the risk of dementia associated with an older subjective age may manifest through intermediate and distinct cognitive markers such as poor memory performance, speed-attention-executive functions, and to a lesser extent extent through lower verbal fluency and lower visuospatial ability. Furthermore, the identification of a replicated relationship between subjective age and both memory and speed-attention-executive functions may contribute to a better understanding of its association with functional health, including functional limitations. Indeed, lower memory, processing speed and executive functions are related to steeper decline in walking speed [47], and feeling older is related to slower gait speed [48]. Therefore, it is likely that an older subjective age may be related to gait speed decline through its link with poorer cognitive functions. From a practical perspective, subjective age assessment may prove useful in risk screening in geriatric medicine and geriatric settings to identify and track individuals at risk of poor cognition, and who may benefit from interventions to maintain cognition. Furthermore, subjective age is modifiable. Indeed, experimental induction of a younger subjective age is related to better memory performance [21]. Therefore, interventions that promote a younger subjective age may lead to better cognitive function.

The present study has several strengths, including examining the prospective association between subjective age and cognitive function in various domains, the two large longitudinal samples of middle-aged and older adults, and follow-ups of almost 20 years. However, there are several limitations to consider. First, the observational design of the present study does not allow causal interpretation. Although subjective age is predictive of cognitive function, it is also possible that cognition influences subjective age. There is little support, however, for such an association [2,3]. More research is needed to test for the reciprocal association between subjective age and cognition. In addition, the baseline levels of each cognitive domain were missing in the HRS and the MIDUS. Therefore, it was not possible to examine the association between subjective age and change in cognitive functioning. More research is needed to examine whether specific facets of subjective age, such as subjective cognitive age, provide a more detailed understanding of the association between subjective age and cognition. More research is also needed to examine whether the associations reported in these samples from the US replicate in other cultures, especially in middle and lower-income countries. Finally, we conducted a large number of interactions that may result in an increased likelihood of false positive effects and higher non-coverage rates.

In sum, the present study revealed that subjective age is prospectively related to performance in different cognitive domains assessed up to 20 years later. Specifically, an older subjective age was consistently related to worse performance in the domains of episodic memory and speed-attention-executive, and to a lesser extent to lower verbal fluency and visuospatial ability. No association was found with numeric reasoning. Therefore, this study contributes to existing knowledge by providing new evidence on the association between subjective age and cognition in adulthood.

Declaration of Competing Interest

None.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jpsychores.2021.110616.

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