Psychological Predictors of Memory Decline in a Racially and Ethnically Diverse Longitudinal Sample of Older Adults in the United States

Short title: Psychological Predictors of Memory Decline

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Abstract

Objectives: In the United States (US), racial and ethnic disparities in memory dysfunction and Alzheimer's disease are evident even after accounting for many risk factors. Psychological factors, such as psychological well-being, perceived control, depressive symptoms, and negative affect, may influence memory dysfunction, and associations may differ by race and ethnicity. This study examined whether psychological factors are differentially associated with episodic memory trajectories across racial and ethnic groups in the US.

Methods/Design: The National Health and Aging Trends Study (NHATS), is a US-representative, longitudinal study of Medicare-eligible adults 65+ years old. Analyses of five years of data, included a total of 9,411 participants without dementia at baseline. Adjusting for relevant covariates, a linear mixed model estimated the associations between psychological predictors and a composite of immediate and delayed trials from a word list memory test.

Results: More depressive symptoms (B=-0.02), lower psychological well-being (B=0.03), and lower perceived control (B=0.05) were independently associated with lower initial memory. Depressive symptoms were associated with faster rate of memory decline (B=-0.01). Black (B=-0.34) and Hispanic (B=-0.28) participants evidenced lower initial memory level than Whites, but only Hispanic (B=-0.04) participants evidenced faster memory decline than Whites. There were no significant interactions between the psychological variables and race and ethnicity.

Conclusions: Results extend previous studies showing racial and ethnic disparities in episodic memory trajectories, and the longitudinal effects of depressive symptoms on episodic memory in US samples. Epidemiological studies of cognitive aging should incorporate more psychological factors clarify cognitive decline and disparities.

Keywords: Disparities, psychological well-being, perceived control, depression

Key points:

- This study sought to examine racial and ethnic differences in the relationship between psychological factors and five-year episodic memory trajectories among older adults in the United States.
- The main finding of the study was that depressive symptoms, perceived control, and psychological well-being are independently related to episodic memory functioning in diverse older adults. Despite differences in psychological functioning and episodic memory across non-Hispanic Black, Hispanic, and non-Hispanic White participants, race and ethnicity did not moderate associations between the psychological factors and memory trajectories.
- Results highlight the need for comprehensive measures of psychological functioning in large studies of memory decline in aging.

Introduction

Racial and Ethnic Disparities in Memory Functioning and Psychological Factors

Non-Hispanic Black (NHB) and Hispanic older adults are at higher risk of Alzheimer's disease (AD) than non-Hispanic White (NHW) older adults, even after controlling for socioeconomic and health risk factors[1]. Given that NHBs and Hispanics are considered racial and ethnic minorities in the United States, these data suggest that a relatively small percentage of the US population have the largest risk of developing AD, highlighting a health disparity experienced by these groups. US-based epidemiological studies of cognitive aging have consistently demonstrated cross-sectional differences in memory performance across racial and ethnic groups, but studies investigating longitudinal changes in memory across racial and ethnic groups have been mixed. Some studies report that NHB and/or Hispanic older adults exhibit more memory decline than NHWs[2], while others report the opposite[3], or find no racial and ethnic differences in rates of decline[4]. These inconsistencies highlight the need for additional research to clarify patterns of minority cognitive aging and contributing factors in US samples. The current study aimed to additionally examine racial and ethnic differences in the association between psychological factors and episodic memory over a five year period in a US sample of participants.

Psychological Factors and Memory Functioning

Growing evidence points to the importance of psychological factors for cognitive aging. For example, depressive symptoms are a risk factor for memory decline in older adults[5]. In addition, negative affect, which has been described as a related but more comprehensive concept of unpleasant emotional experience compared to depressive symptoms[6], is also associated with worse memory performance[7]. It may be that negative affect and depressive symptoms lead to

worse episodic memory by reducing engagement in beneficial activities such as physical activity[8] and/or by elevating stress-induced physiological process[9].

While depressive symptoms and negative affect have consistently been shown to be risk factors for worse memory performance[5,10], less is known about psychological protective factors. One potential protective factor is psychological well-being (PWB). PWB is a distinct facet of well-being that represents aspects of meaningfulness and self-realization in one's life[11]. Importantly, higher PWB has been associated with better memory[12]. PWB may enhance cognitive performance through its beneficial effects on health[13].

Another potential protective factor is perceived control, which can be conceptualized as both confidence in one's ability to complete various tasks successfully and the perception that internal factors affect one's ability to attain important life outcomes[14]. Greater perceived control has been linked to better memory performance in older adults[15], and may do so through increased motivation to engage in health behaviors such as physical activity[16] that are related to improved cognitive health[17].

Because these psychological factors are potentially modifiable, additional research on their associations with late-life cognitive decline is warranted. Most large-scale epidemiological studies of cognitive aging lack a comprehensive assessment of psychological functioning and only one aspect of psychological functioning despite evidence that these psychological risk and protective factors are interrelated[18]. Better understanding of independent associations between different aspects of psychological functioning is needed to clarify potential intervention targets.

The role of psychological factors in racial and ethnic differences in cognitive aging is relatively understudied. It is possible that psychological factors exhibit differential impact on

cognitive aging across racial and ethnic groups. In the US, depressive symptoms are more strongly associated with worse cognitive functioning among NHB older adults, compared with NHW older adults, even when NHBs report, on average, fewer depressive symptoms[19]. Perceived control and PWB have also been differentially associated with health outcomes across race and ethnicity[20]. For example, perceived control is more strongly associated with benefit from a cognitive intervention among NHB older adults than among NHW older adults[21]. Virtually no studies have directly examined racial and ethnic differences in the impact of PWB and negative affect on memory in US samples. Evidence for differential impact may reflect racial and ethnic differences in cultural or environmental factors that can buffer or exacerbate risk[22]. In line with the theory of compound disadvantage[22], individual risk factors may be compounded by contexts that are disproportionately experienced by certain racial and ethnic minority groups in the US, such as lower educational attainment, lower income, more physically demanding occupations, and poorer housing and nutritional options.

The Current Study

Using a large, US-representative epidemiological study, the current study aimed to (1) evaluate differences in memory trajectories between racial and ethnic groups, (2) examine independent effects of psychological risk and protective factors on memory trajectories, and (3) determine whether race moderates associations between psychological factors and memory outcomes. We predicted that NHBs and Hispanics would exhibit lower initial memory performance and faster rates of memory decline than NHWs. We also predicted that psychological risk factors (e.g., depressive symptoms, negative affect) would be associated with lower initial memory and faster rate of memory decline, while psychological protective factors (e.g., PWB, perceived control) would be associated with higher initial memory and slower rate of

memory decline. Finally, we hypothesized that race and ethnicity would moderate relationships between psychological factors and memory trajectories such that NHB and Hispanic older adults would show stronger associations compared to NHWs.

Methods

Data were drawn from the National Health and Aging Trends Study (NHATS)[23], a US-representative sample of adults age 65 and older receiving Medicare that has collected longitudinal data annually since 2011. The fifth wave (2015) included a replenishment sample in order to maintain target sample size; the same recruitment criteria utilized in 2011 were utilized for the 2015 replenishment sample. In the current study, "baseline" was defined as participants' first visit, which corresponded to Wave 1 (2011) for the original sample and Wave 5 (2015) for the replenishment sample. Baseline and follow-up visits included face-to-face interviews of the sampled person that gathered sociodemographic information, and individual and family medical and social history. Psychosocial questionnaires, cognitive tests, and physical performance tasks were also administered face-to-face at each visit; proxy responses were not used in the current analyses. NHATS is managed by Johns Hopkins University and received IRB approval.

Participants

We utilized five waves of data from 2011-2015. Race and ethnicity were self-reported at baseline and dummy-coded as non-Hispanic White (NHW), non-Hispanic Black (NHB), or Hispanic of any race; reference: NHW.

Our final sample consisted of 9,411 individuals in the US after applying the following exclusion criteria at baseline: probable dementia following procedures outlined by Kasper et al[24] (n=2,045), residing in a nursing home (n=468), and self-reported race and ethnicity other than NHW, NHB, or Hispanic (n=503).

Episodic memory

The outcome variable, episodic memory, was assessed face-to-face using a 10-item list learning task consisting of a single immediate recall trial and a delayed recall trial after a five-minute delay. Immediate and delay scores were converted to z-scores using means and standard deviations from the baseline occasion, and resultant z-scores were averaged for each visit, including the baseline visit. Factor structure was similar for NHW, NHB, and Hispanics [25].

Psychological measures

Depressive symptoms over the past month were assessed at baseline with two items from the Patient Health Questionnaire-2 (PHQ-2)[26], which characterize the core symptoms of clinical depression: "How often have you felt down, depressed, and hopeless?" and "How often have you had little interest or pleasure in doing things?" Items were measured on a 4-point scale ranging from *Not at all* (1) to *Nearly every day* (4). Scores were summed across the 2 items, and total scores ranged from 2 to 8 with higher scores corresponding to more depressive symptoms.

Negative affect over the past month was assessed at baseline with one item from the Positive and Negative Affect Schedule (PANAS)[6]: "How often did you feel upset?" and one item from the Affect Balance Scale (ABS)[27]: "How often did you feel bored?" Items were rated on a 5-point scale ranging from *Every day* (1) to *Rarely* (5). Items were reverse-coded and summed, and total scores ranged from 2 to 10 with higher scores corresponding to greater negative affect.

Perceived control was assessed at baseline with two items from the Perceived Control scale[28]: "Other people determine most of what I can and cannot do" and "When I really want to do something, I usually find a way to do it." Participants provided their overall level of agreement with each statement using a 3-point scale ranging from *Agree a lot* (1) to *Agree not at*

all (3), the first item was reverse-coded, and items were summed. Total scores ranged from 2 to 6, with higher scores corresponding to greater perceived control.

Psychological Well-Being (PWB) was assessed at baseline with five items adapted from the Psychological Well-Being scale[11]: "I gave up trying to improve my life a long time ago," "I like my living situation very much"(r), "I feel confident and good about myself" (r), "My life has meaning and purpose" (r), and "I have an easy time adjusting to change" (r). Participants provided their overall level of agreement with each statement using a 3-point scale from *Agree a lot* (1) to *Agree not at all* (3). Items denoted with (r) were reversed-coded, and all items were summed. Total scores ranged from 5 to 15, with higher scores corresponding with greater PWB.

Covariates

Covariates included number of self-reported medical diagnoses (heart attack, heart disease, high blood pressure, arthritis, osteoporosis, diabetes, lung disease, cancer), sociodemographics (age, gender [reference: male], marital status [married/partnered, never married, divorced/separated, widowed; reference: married/partnered]), and socioeconomic measures at baseline (continuous total yearly household income, education [dummy coded high school diploma, less than high school diploma, some college but less than Bachelor's degree, at least Bachelor's degree; reference: high school diploma]).

Statistical analysis

Analyses included baseline measures of psychological factors, demographics, socioeconomic indicators, and disease burden to examine how these factors prospectively contribute to longitudinal memory trajectories.

Initially, a series of ANOVAs with Bonferroni-corrected post-hoc tests compared racial and ethnic groups. Memory trajectories were modeled in SPSS using multilevel models with

maximum likelihood estimation. Time was parameterized as years from the baseline assessment (2011 or 2015). All models controlled for baseline age, which was centered at the overall sample mean. An initial model quantified the overall effect of time. Then, race and ethnicity and their interactions with time were added to the model to estimate racial and ethnic differences in initial memory and rate of memory decline, respectively. Next, baseline psychological factors, covariates, and their interactions with time were added to quantify the independent effects of depressive symptoms, negative affect, PWB, and perceived control on memory trajectories. Finally, interactions between baseline psychological factors (depressive symptoms, negative affect, perceived control, PWB) and race and ethnicity, as well as three-way interactions involving time, were added individually to test whether race or ethnicity significantly moderated the effects of psychological factors.

Correlations among the psychological factors (negative affect, depressive symptoms, PWB, and perceived control) were small to medium (Supplemental Digital Content 1). Adequate tolerance (all > 0.72) and VIF (all < 1.39) suggested that these psychological factors may function as related, but distinct, resources for cognitive functioning.

Results

Characteristics of the total sample, and by race and ethnicity, are reported in Table 1.

Racial and Ethnic Differences in Variables of Interest at Baseline

There were no significant racial or ethnic differences in negative affect ($F(2,9255)=0.38$, $p=0.682$), but there were significant differences in depressive symptoms ($F(2, 9373)=42.26$, $p<.001$), perceived control ($F(2,9229)=31.042$, $p<.001$, psychological well-being (PWB; $F(2,9154)=34.943$, $p<.001$), and episodic memory, ($F(2,9198)=202.04$, $p<.001$). As shown in Table 2, NHWs reported significantly fewer depressive symptoms than NHBs, who reported

significantly fewer depressive symptoms than Hispanics. NHBs reported significantly greater PWB than NHWs, who reported significantly greater PWB than Hispanics. NHW participants reported significantly greater perceived control than NHBs, who reported significantly greater perceived control than Hispanic participants. NHWs had significantly higher episodic scores than both NHBs and Hispanics, with no difference between NHBs and Hispanics.

Longitudinal Trajectory of Episodic Memory

Results of the initial model indicated that, on average, memory declined over the five-year study period (*B*=-0.02, SE=0.00, *p*<.001; CI: -0.02 to -0.01). For Aim 1, both NHBs (*B*=-0.49, SE=0.02, *p*<.001; 95% CI: -0.53 to -0.45) and Hispanics (*B*=-0.51, SE=0.04, *p*<.001; CI: -0.58 to -0.44) exhibited lower initial memory than NHWs, but only Hispanics (*B*=-0.04, SE=0.01, *p*=0.02; CI: -0.06 to -0.01) exhibited faster memory decline than NHWs (Figure 1). These effects were attenuated, but still significant, after including all covariates and psychological factors in the model (Table 3). Regarding Aim 2, fewer depressive symptoms, greater PWB, and greater perceived control were each independently related to better initial memory, but only depressive symptoms were related to rate of memory decline. Specifically, more depressive symptoms were associated with faster memory decline. Regarding Aim 3, none of the relationships between psychological variables with initial memory nor memory slope were moderated by race or ethnicity (all *p*s>0.05). A sensitivity analysis that additionally covaried for baseline scores on the Clock Drawing Test revealed the same pattern of results.

Discussion

The current study examined whether the effects of psychological factors on episodic memory over a five year period were moderated by race and ethnicity in the US. Results indicated that non-Hispanic Black (NHB) and Hispanic older adults exhibited worse initial

memory performance compared to non-Hispanic White (NHW) older adults, while only Hispanics additionally demonstrated a faster rate of memory decline than NHWs. These disparities persisted after controlling for racial and ethnic differences in psychological functioning, socioeconomic status, and health. Results also indicated that both positive and negative aspects of psychological functioning were independently associated with initial memory level, while only depressive symptoms were independently associated with subsequent memory decline. Finally, magnitudes of the associations between psychological factors and memory trajectories did not significantly differ by race or ethnicity.

Our finding that NHBs and Hispanics had worse memory than NHWs at baseline supported our Aim 1 hypothesis and is consistent with findings in other population studies in the US[2]. These racial and ethnic differences in memory trajectory were not eliminated after including relevant socioeconomic and psychological variables in the model which suggests that mediators of racial and ethnic disparities in memory warrant further study.

Hypotheses for racial and ethnic differences in memory slope were partially supported but also suggest that memory disparities are not the same across different racial and ethnic minority groups in the US. Specifically, Hispanics, but not NHBs, had faster memory decline compared with NHWs. One possible explanation for this finding relates to literacy. First, previous studies with US samples have shown that differences in rates of cognitive decline between racial and ethnic groups are driven, in part, by differences in literacy. Manly et al[29] found that more NHB older adults had higher literacy levels, compared with Hispanic older adults, and higher literacy was associated with slower memory declines. Thus, in the present study, lower literacy among Hispanics may have contributed to the significant differences in memory.

The relative lack of information about within-group heterogeneity limited our ability to thoroughly explore potential explanations for Hispanic-NHW differences that persisted despite controlling for socioeconomic status and physical health. For example, previous studies have discussed the impact of acculturation, immigration status, and generation (e.g., whether someone is a new immigrant) on cognitive outcomes among Hispanics who immigrated to the US[30], and these factors may be driving the faster rate of decline among Hispanic participants in this sample.

Main effects of psychological factors on memory trajectories provided partial support for our Aim 2 hypothesis in that three of the four psychological factors (depressive symptoms; psychological well-being, PWB; and perceived control) were independently associated with initial memory level, and depressive symptoms were additionally associated with memory decline. The absence of a significant relationship between negative affect and memory is in contrast with a recent experimental study by Bisby and Burgess[7] who reported an association between negative affect and memory. However, participants in the current study were asked to report based on experiences in their natural setting in the US, whereas the Bisby study administered specific anxiety-provoking stimuli that led to circumscribed memory impairments in an experimental setting in the United Kingdom.

The finding that depressive symptoms were associated with not only lower initial memory, but also faster memory decline replicates findings from previous studies on the influential role of depressive symptoms in late-life memory trajectories[5,31,32]. Depressive symptoms may be a risk factor for cognitive decline due to their association with physiological changes that can affect the central nervous system. Depressive symptoms have been associated with cortisol dysregulation[9], which in turn, can lead to smaller hippocampal volume[33]. Smaller hippocampal volume is associated with lower performance in episodic memory in older adults[33].

Another way in which depressive symptoms can influence cognitive decline is through health behaviors. Depressive symptoms have been related to lower activity engagement[8], and engagement in activities such as physical exercise and cognitively-stimulating hobbies may be beneficial for memory among older adults[17,34].

The finding that greater perceived control was independently related to better baseline memory performance is consistent with other studies[15]. Individuals with higher perceived control may be more motivated to engage in physical activity and other healthy behaviors[16] that lead to better physical and cognitive health[17]. In contrast, if an individual perceives uncontrollable barriers to achieving health-related goals, then s/he may be less likely to engage in health promoting behaviors. The perception of uncontrollable forces limiting life outcomes is also inherently stressful[35]. Therefore, lower perceived control may also be associated with worse memory performance via the negative effects of stress hormones on brain regions important for successful memory performance, including the hippocampus. Because we did not find an effect of perceived control on memory change over time, we cannot rule out the possibility that the cross-sectional association between perceived control and initial memory level may also reflect reverse causation. Specifically, lower memory ability may lead to the perception of less perceived control over life outcomes. However, it should be noted that other longitudinal studies have reported that aspects of perceived control predict subsequent changes in memory, but not vice versa[36].

Independent of depressive symptoms and perceived control, greater PWB was associated with higher baseline memory, but not with memory change. This pattern of results is similar to other studies reporting a positive relationship between PWB and memory[12]. It may be that PWB could positively affect health[13], resulting in better affective and cognitive processing[12].

Our third hypothesis was not supported in that we found no evidence that race and ethnicity in this US sample moderated the relationships between any of the psychological factors and memory trajectories. It is possible that the differential cognitive impact of individual psychological factors across race and ethnicity documented in previous studies reflects racial and ethnic differences in other aspects of psychological functioning that were simultaneously accounted for in the current study. Indeed, we found that there were significant racial and ethnic differences in three out of the four psychological factors considered in this study (e.g., depressive symptoms, perceived control, and well-being). Specifically, our findings were similar to those of other studies in that NHBs and Hispanics reported greater PWB[37], and NHWs reported more perceived control[38] and better mood[19]. Of note, while other studies have found that NHBs may report more depressive symptoms[39], NHBs also have reduced lifetime incidence of clinical depression[40] compared to NHW. Thus, future studies investigating racial differences should consider different operationalizations of depressive symptoms.

Limitations and Future Directions

Although this study provides preliminary evidence for the potential importance of different components of psychological functioning to cognitive aging, there were several limitations. For example, NHATS only administered a subset of psychological items, rather than complete scales. This may have contributed to the lack of association between negative affect and memory, as the two negative affect items (e.g., boredom, upset) may not sufficiently capture the aspects of negative affect that are likely to influence cognitive performance. Future studies can build upon the current study by including more comprehensive measure of psychological risk and protective factors, as well as samples of individuals with and without clinical diagnoses of depression and other psychiatric disorders. Indeed, the promising findings of this study

support the inclusion of more comprehensive psychiatric measurement in large epidemiological studies of cognitive aging in order to better predict cognitive trajectories, and to allow for further study of relationships among race, ethnicity, psychological functioning, and memory decline.

This study had several strengths. First, we used longitudinal data in a large, US-representative sample of older adults, which allowed us to describe overall memory trajectory and group differences in memory trajectory. Additionally, we examined both psychological risk and protective factors in a single model, and we demonstrated their independent effects on episodic memory above and beyond sociodemographic factors that are known to affect memory in older adults.

Conclusion

This study provides evidence that racial and ethnic disparities in memory aging persist despite controlling for differences in socioeconomic status, health, and psychological functioning. It also provides preliminary evidence that different aspects of psychological functioning are independently associated with memory in older adults, and these associations do not appear to differ across racial and ethnic groups in the US. Better understanding both psychological risk and protective factors may inform future policies and interventions to improve cognitive aging for diverse older adults.

Data availability statement: The data that support the findings of this study are openly available in the National Health and Aging Trends Study at https://www.nhatsdata.org/, reference number 23.

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Table 1. Sample Characteristics and Comparisons Across Racial Groups at Baseline

	Whole sample N = 9,411	Non-Hispanic White N = 6,817	Non-Hispanic Black N = 2,034	Any race Hispanic N = 560	Group differences[b]
Age, mean (SD), years	76.2 (7.48)	76.62 (7.61)	75.09 (6.93)	75.25 (7.27)	W>H=B
Disease count, mean(SD)[a]	2.37 (1.45)	2.35 (1.46)	2.47 (1.42)	2.30 (1.45)	B>W=H
Total income, mean (SD), $	58,685 (358,264)	67,547 (409,706)	33412 (65,154)	42,095 (296,069)	W=H>B
Gender, n (%)					
Male	4019 (42.7)	2968 (43.5)	805 (39.6)	246 (43.9)	B<W=H
Female	5392 (57.3)	3849 (56.5)	1229 (60.4)	314 (56.1)	B>W=H
Marital Status, n, (%)					
Married/partnered	4947 (52.6)	3913 (57.4)	743 (36.5)	291 (52.1)	W>H>B
Divorced/separated	1264 (13.4)	702 (10.3)	466 (23.0)	96 (17.2)	B>H>W
Never married	366 (3.9)	202 (3.0)	146 (7.2)	18 (3.2)	B>H=W
Widowed	2828 (30.1)	1999 (29.3)	675 (33.3)	154 (27.5)	B>W=H
Education, n (%)					

HS Diploma	2619 (27.8)	2007 (29.4)	524 (25.9)	88 (15.7)	W>B>H
< HS diploma	2070 (22.0)	1038 (15.2)	711 (35.1)	321 (57.3)	H>B>W
Some college, < Bachelors	2513 (26.7)	1939 (28.5)	476 (23.5)	98 (17.5)	W>B>H
Bachelors or higher	2197 (23.4)	1828 (26.8)	316 (15.6)	53 (9.5)	W>B>H

Abbreviation: HS = high school; W = non-Hispanic White; H = Hispanic (any race); B = non-Hispanic Black.

[a] Range = 0-8.

[b] Bonferroni-corrected group differences.

Table 2. Group Means and Mean Differences in Variables of Interest at Baseline

	Mean (SD) at baseline				
	Whole sample	Non-Hispanic White	Non-Hispanic Black	Any race Hispanic	Group differences[a]
Depressive symptoms (2-8)	2.9 (1.3)	2.8 (1.2)	3.1 (1.4)	3.2 (1.6)	W<B<H
Negative affect (2-10)	4.1 (1.5)	4.1 (1.5)	4.1 (1.6)	4.2 (1.8)	W=B=H
Perceived Control (2-6)	5.5 (0.8)	5.6 (0.8)	5.5 (0.8)	5.3 (0.9)	H<B<W
Psychological well-being (5-15)	13.6 (1.6)	13.5 (1.6)	13.7 (1.5)	13.3 (1.8)	H<W<B
Episodic memory z-score composite	.01 (.91)	.12 (.91)	-.29 (.83)	-.31 (.86)	H=B<W

Note: Range of values for psychological factors is in parentheses.

Abbreviations: W = non-Hispanic White; H = Hispanic (any race); B = non-Hispanic Black.

[a] Bonferroni-corrected group differences.

Table 3. Unstandardized Regression Coefficients in the Final Model (continued on next page)

	B (SE)	*p*	95% CI
Baseline Memory			
Sociodemographic factors			
Centered Age	-0.04 (0.00)	<.001	-0.04 to -0.04
Total income	-2.28×10^{-9} (2.64×10^{-8})	.93	-5.40×10^{-8} to 4.94×10^{-8}
Disease count	-0.01 (0.01)	.15	-0.02 to 0.00
< HS diploma[a]	-0.29 (0.03)	<.001	-0.35 to -0.23
Some college, < Bachelor's degree[a]	0.08 (0.03)	.006	0.02 to 0.13
≥ Bachelor's degree[a]	0.35 (0.03)	<.001	0.29 to 0.40
Never married[b]	-0.11 (0.05)	.04	-0.21 to -0.01
Divorced/separated[b]	-0.07 (0.03)	.02	-0.13 to -0.01
Widowed[b]	-0.04 (0.03)	.12	-0.09 to 0.01
Female[c]	0.31 (0.02)	<.001	0.26 to 0.35
NHB[d]	-0.34 (0.03)	<.001	-0.39 to -0.29
Hispanic[d]	-0.28 (0.04)	<.001	-0.36 to -0.19
Psychological factors			
NA	-0.01 (0.01)	.06	-0.03 to 0.00
PHQ-2	-0.02 (0.01)	.007	-0.04 to -0.01
PWB	0.03 (0.01)	<.001	0.01 to 0.04
PC	0.05 (0.01)	<.001	0.02 to 0.08

Abbreviations: HS, high school; NA, negative affect; NHB, non-Hispanic Black; PC, perceived control; PHQ-2, Patient Health Questionanaire-2, depressive symptoms; PWB, psychological well-being.

[a] Reference is HS diploma.

[b] Reference is Married

[c] Reference is Male.

[d] Reference is non-Hispanic White.

Table 3. Unstandardized Regression Coefficients in the Final Model (continued from previous page)

	B (SE)	*p*	95% CI
Memory Slope			
Sociodemographic factors			
Centered Age	-0.00 (0.00)	<.001	-0.00, -0.00
Total income	-5.83×10^{-9} (7.22×10^{-9})	.42	-2.00×10^{-8} to 8.33×10^{-9}
Disease count	-0.00 (0.00)	.90	-0.01 to 0.00
< HS diploma[a]	0.02 (0.01)	.08	-0.00 to 0.04
Some college, <Bachelor's degree[a]	0.02 (0.01)	.07	-0.00 to 0.04
≥ Bachelor's degree[a]	0.02 (0.01)	.02	0.00 to 0.04
Never married[b]	0.02 (0.02)	.45	-0.02 to 0.05
Divorced/separated[b]	-0.01 (0.01)	.62	-0.03 to 0.02
Widowed[b]	0.00 (0.01)	.91	-0.02 to 0.02
Female[c]	0.00 (0.01)	.78	-0.01 to 0.02
NHB[d]	-0.01 (0.01)	.20	-0.03 to 0.01
Hispanic[d]	-0.04 (0.02)	.03	-0.07 to -0.00
Psychological factors			
NA	0.00 (0.00)	.77	-0.00 to 0.01
PHQ-2	-0.01 (0.00)	.04	-0.01 to -0.00
PWB	-0.00 (0.00)	.77	-0.00 to 0.00
PC	-0.00 (0.01)	.37	-0.02 to 0.01

Abbreviations: HS, high school; NA, negative affect; NHB, non-Hispanic Black; ; PC, perceived control PHQ-2, Patient Health Questionanaire-2, depressive symptoms; PWB, psychological well-being.

[a] Reference is HS diploma.

[b] Reference is Married

[c] Reference is Male.

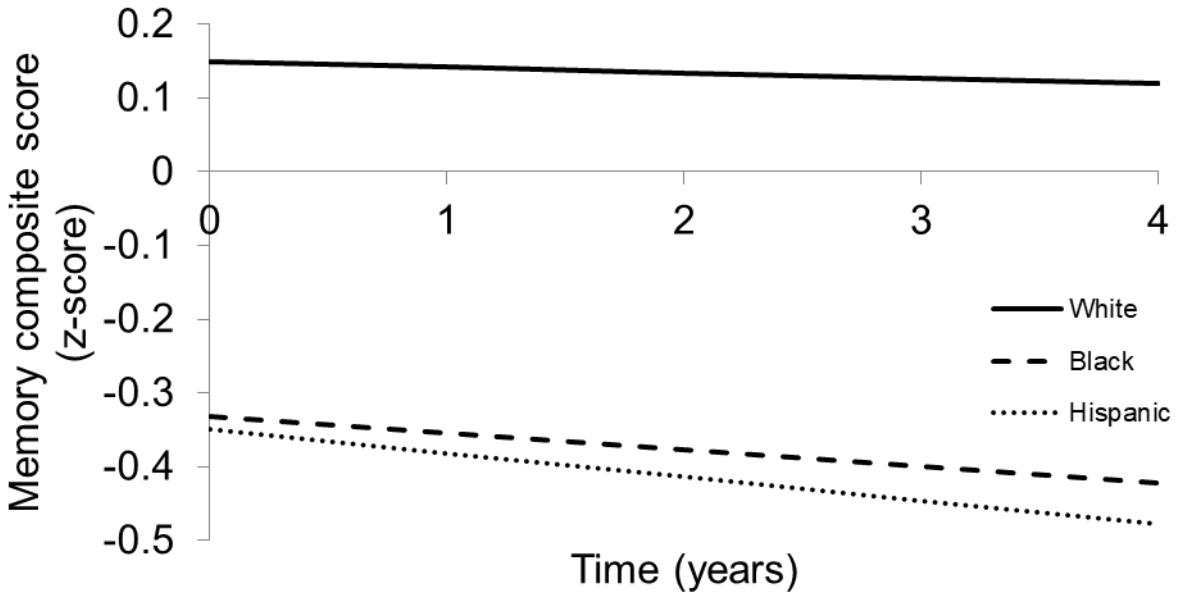
[d] Reference is non-Hispanic White.

Figure Legend

Figure. Memory Trajectory by Race and Ethnicity, Controlling for Age.

Supporting Information

Supplemental Table 1. Zero Order Correlations of Psychological Factors



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