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Abstract

Objectives: Structural racism creates contextual stressors that disproportionately affect Black, relative to White, older adults in the U.S. and may contribute to worse cognitive health. We examined the extent to which interpersonal, community, and societal stressors uniquely explain Black-White disparities in initial memory and memory change.

Methods: The sample included 14,199 non-Latino Black and White older adults (M_{age}=68.32, 19.8% Black) from the U.S. Health and Retirement Study who completed psychosocial questionnaires at baseline and a word list memory task every two years over an eight-year period. Interpersonal, community, and societal stressors were operationalized as self-reported everyday discrimination, neighborhood physical disorder, and subjective societal status, respectively. Latent growth curves modeled longitudinal memory performance. Stressors were modeled simultaneously and allowed to correlate. Covariates included age, sex, education, wealth, parental education, and Southern residence.

Results: Compared to White participants, Black participants experienced more discrimination (β=–.004, *SE*=.001, p<.001), more neighborhood physical disorder (β=–.009, *SE*=.002, p<.001), and lower perceived societal status (β=–.002, *SE*=.001, p=.001), each of which uniquely mediated the racial disparity in initial memory. Sensitivity analyses utilizing proxy-imputed memory scores revealed an additional racial disparity in memory change, wherein Black participants evidenced faster decline than White participants. This disparity in memory change was only uniquely mediated by more everyday discrimination among Black participants.

Discussion: Elements of structural racism may contribute to cognitive disparities via disproportionate stress experiences at multiple contextual levels among Black older adults.

Future research should consider multilevel protective factors that buffer against negative impacts of racism on health.

Keywords: Cognitive aging, Health inequities, Social determinants of health

Introduction

Alzheimer's disease and related dementias (ADRD) disproportionately occur among Black older adults in the United States (U.S.), such that the prevalence of ADRD among Black older adults is nearly twice that among White older adults (Rajan et al., 2021). In 2020, the U.S. census-adjusted prevalence of ADRD was 19% among Black older adults, compared to only 10% among White older adults (Rajan et al., 2021). In addition to disparities in prevalence rates, research also demonstrates that Black older adults with ADRD are more likely to experience delayed diagnosis and worse medical care than White older adults with ADRD (Hinton et al., 2024). Growing research demonstrates that inequities in social and environmental factors stemming from structural racism likely contribute to this increased prevalence via physical, mental, and cognitive health pathways. Formative work by Jones (2000) discusses three levels of racism – internalized, interpersonal, and institutional – but much of the work on racism and ADRD risk has focused primarily on interpersonal racism, such as everyday discrimination. Recent work by Adkins-Jackson and colleagues (2023) outlines the importance of utilizing a multisystem approach based on Bronfenbrenner's bioecological model (Bronfenbrenner, 1977) to understand structural and social determinants of health associated with racial disparities in ADRD to improve health equity.

Racially patterned psychosocial stressors exist at multiple levels of influence, including interpersonal, community, and societal levels, and may each contribute to the increased ADRD risk observed among Black older adults (Hill et al., 2015). Psychosocial stressors at each of these levels disproportionately affect Black adults in the U.S. (Barnes et al., 2004; Williams et al., 1997). Stressors across these levels are interrelated; thus, focusing on stressors at only one level precludes full understanding of the influence of structural racism on ADRD risk (Adkins-Jackson

et al., 2023). A major interpersonal stressor among Black Americans is everyday discrimination (Clark et al., 1999; Williams et al., 1997), characterized by the experience of harmful, unfair interpersonal treatment (e.g., being treated with less respect) based on perceived identity. More everyday discrimination is associated with worse cognitive health among Black older adults (Barnes et al., 2012; Zahodne et al., 2019), demonstrating its importance in studying cognitive health disparities.

However, everyday discrimination does not occur in a vacuum but rather in the context of multiple systems inherently designed to disadvantage Black Americans (Adkins-Jackson et al., 2023; Dean & Thorpe, 2022). An exclusive focus on everyday discrimination may over-estimate its effect without consideration for overarching systems driving interpersonal *and* additional levels of discrimination (Dean & Thorpe, 2022; Williams et al., 2019). Given calls to better characterize additional levels of racism and their effects on health (Adkins-Jackson et al., 2023; Dean & Thorpe, 2022; Williams et al., 2019), we aimed to consider simultaneous effects of multiple racially patterned stressors to move beyond an individual focus and identify multiple intervention targets to promote health equity in cognitive aging.

In addition to interpersonal stress induced by everyday discrimination, Black older adults in the U.S. may experience stress at the neighborhood level due to the legacy of redlining and continued racist housing/lending practices resulting in neighborhood disinvestment. Specifically, Black adults in the U.S. are more likely to live in physically disordered neighborhoods (Mendes De Leon et al., 2009), characterized by reports of feeling unsafe in the neighborhood and signs of disinvestment (e.g., vacant buildings). Despite redlining no longer being legally sanctioned, neighborhood physical disorder is heavily influenced by continued disinvestment, discriminatory lending, and long-lasting effects of historical redlining (Lynch et al., 2021), which continue to

influence neighborhood characteristics and residents' health (Lee et al., 2022). More neighborhood physical disorder is associated with heightened depression and anxiety symptoms (Hill et al., 2005) and cardiovascular disease (Barber et al., 2016), which are risk factors for dementia (Livingston et al., 2020). Neighborhood physical disorder is also directly associated with worse episodic memory (Zaheed et al., 2019) and increased risk for dementia (Wong & Wang, 2022). Thus, neighborhood physical disorder represents an important element of structural racism to consider when examining health disparities in cognitive aging.

Along with interpersonal and neighborhood-level inequities, societal-level inequity is also relevant to racial health disparities. Subjective societal status represents societal-level stress as perceived by an individual. Societal status is frequently measured using the Cantril Scale of Subjective Social Status (Cantril, 1965; Cundiff et al., 2013), which asks participants to compare themselves to others in the U.S. based on money, occupation, and educational attainment. Because these objective factors are deeply influenced by systems designed to disadvantage Black Americans, it is not surprising that Black Americans in the Health and Retirement Study (HRS) report lower subjective societal status than White Americans (Zahodne et al., 2018). These studies found that Black Americans reported lower subjective societal status than White Americans even after controlling for objective socioeconomic measures, suggesting that additional factors contribute to Black Americans' perception of lower subjective societal status. Such perceptions reflect an additional source of racially patterned stress beyond that related to lower socioeconomic resources. Indeed, prior research has conceptualized subjective societal status as a contributor to individuals' perceptions of stress (Friedman et al., 2012; Lindert et al., 2022). Lower subjective societal status is associated with negative cognitive health outcomes (Kobayashi et al., 2021; Lindert et al., 2022; Zahodne et al., 2018) even after accounting for

objective indicators of socioeconomic status, pointing to the importance of considering this societal-level indicator of inequity when investigating psychosocial predictors of cognitive health disparities.

Each of these stressors – discrimination, disordered neighborhoods, and lower subjective societal status – is associated with worse late-life cognitive health (Barnes et al., 2012; Kobayashi et al., 2021; Lindert et al., 2022; Wong & Wang, 2022; Zaheed et al., 2019; Zahodne et al., 2018, 2019). Because these stressors co-occur due to racism's pervasive nature across systems (Adkins-Jackson et al., 2023; Dean & Thorpe, 2022; Hill et al., 2015), their relative contributions to memory disparities are not well understood. Accounting for multiple contextual stressors is needed to identify and prioritize intervention targets to promote health equity in cognitive aging.

Aims & Hypotheses

The aims of this study were to (1) investigate unique effects of psychosocial stressors across levels of influence on memory trajectories, and (2) estimate the extent to which these psychosocial stressors explain racial disparities in memory trajectories (see Figure 1). We hypothesized that more interpersonal (more everyday discrimination), community (more neighborhood physical disorder), and societal (lower subjective societal status) stressors would be uniquely associated with worse memory (Hypothesis 1). We also hypothesized that more psychosocial stress at each level would uniquely mediate disparities in memory trajectories between Black and White participants (Hypothesis 2).

Methods

Data Source and Participants

Data were from the HRS, a longitudinal, U.S.-representative study of adults aged 51+ conducted every two years since 1992 (Sonnega et al., 2014). The HRS is sponsored by the National Institute on Aging (NIA U01AG009740) and is conducted by the University of Michigan. More information regarding the HRS can be found on the HRS website (https://hrs.isr.umich.edu/). Study procedures were approved by the University of Michigan Institutional Review Board. Participants provided informed consent with each wave of participation.

The leave-behind questionnaire was implemented in 2006 (Smith et al., 2023). In 2010, a refresher sample was introduced into the HRS to maintain the representativeness of adults aged 51+ in the U.S. and to improve racial representation. At each wave, a random half of the sample completes the psychosocial leave-behind questionnaire. The present study utilizes data from participants who completed the leave-behind questionnaire in 2010 or 2012, resulting in 21,292 participants. Of these participants, 1,077 were excluded due to being under age 51, 3,263 were excluded due to self-identifying as a race/ethnicity other than non-Hispanic/Latino White or Black, 2,281 were excluded due to missing covariates, and 472 were excluded due to missing all outcome variables. Full information maximum likelihood was utilized to address missing data on individual outcome variables. This resulted in a final sample size of 14,199 Black (2,808) and White (11,391) adults aged 51+.

Measures

Self-Reported Race

Participants in the HRS are asked at baseline, “What race do you consider yourself to be: White, Black or African American, American Indian, Alaska Native, Asian, Native Hawaiian, Pacific Islander, or something else?” to determine self-identified race. Ethnicity was examined

with the question, “Do you consider yourself Hispanic or Latino?” Due to the present study’s focus on Black-White disparities, only participants who responded identifying their race as White or Black/African American without Hispanic/Latino ethnicity were included. A single dichotomous variable (0=White, 1=Black) was included in the model as a covariate (Aim 1) and as the exposure variable (Aim 2).

Racially Patterned Psychosocial Stressors

Racially patterned psychosocial stressors were conceptualized at the interpersonal, community, and societal levels. Interpersonal psychosocial stress was operationalized as everyday discrimination, measured by the Everyday Discrimination Scale (Williams et al., 1997), a 10-item self-report measure that assesses daily discrimination experiences (e.g., being treated with less respect than others). Responses are on a six-point Likert-type scale ranging from 1 (Almost every day) to 6 (Never). Items were reverse coded such that higher scores indicated more everyday discrimination and interpersonal stress. Scores were averaged to create a composite everyday discrimination variable to use in analyses.

Community psychosocial stress was operationalized as neighborhood physical disorder (e.g., presence vacant houses or storefronts), as measured by four items designed by Cagney and colleagues (2009). The questionnaire defines “neighborhood” as “everywhere within a 20-minute walk or about a mile” of the participant’s home. Participants rated their perceptions of their neighborhood using a seven-point Likert-type scale ranging from 1 (more physical disorder) to 7 (less physical disorder). Items were reverse coded so that higher scores indicated more neighborhood physical disorder and community-level stress. Scores were averaged to create a composite neighborhood physical disorder variable to use in analyses.

Societal psychosocial stress was operationalized as subjective societal status, as measured by the Cantril Ladder (Cantril, 1965). Participants are shown a ten-rung ladder, where the lowest rung represents people with the lowest standing in the U.S., and the highest rung represents those with the highest standing in the U.S. Participants indicated which rung they felt best represents their social standing compared to others in the U.S. Responses range from 1 to 10, with higher scores indicating higher subjective societal status and less societal-level stress.

Initial Memory and Memory Change over Time

Episodic memory was utilized as the outcome variable because it is a strong predictor of ADRD risk (Bäckman et al., 2001). Episodic memory was measured using an HRS version of the Consortium to Establish a Registry for Alzheimer's Disease (CERAD) Immediate and Delayed Recall word list learning (Ofstedal et al., 2005). Participants were read a list of ten words and asked to recall as many words as they could immediately following presentation of the list and after a five-minute delay. Raw scores of how many items participants recalled at immediate and delayed trials were converted to z-scores using the baseline mean and standard deviation from the combined 2010 and 2012 sample halves. Z-scores for immediate and delayed trials were averaged to obtain a composite of episodic memory at baseline and up to four additional follow-up waves. Participants in the 2010 half-sample had episodic memory scores from 2010, 2012, 2014, 2016, and 2018 (five possible waves), and participants in the 2012 half-sample had scores from 2012, 2014, 2016, and 2018 (four possible waves). Missing values for wave 5 scores for the 2012 half-sample were largely explained by the covariate representing baseline year.

Covariates

Covariates included age, years of education, sex, wealth, baseline year (2010 or 2012), parental education, Southern birthplace, and Southern residence at baseline. Age was self-

reported in years at baseline. Education was self-reported years of education completed (0-17). Household wealth was the difference between total assets and debts at baseline. To adjust for early life socioeconomic experiences that may contribute to increased risk for ADRD, parental education was included as a covariate. Parental education ranged from 0-17 and was averaged across both parents; if one parent was missing data on educational attainment, the sole available parental education value was utilized. Based on literature demonstrating increased risk for ADRD among people born in (George et al., 2021) and living in the South (Wadley et al., 2011), compared to other U.S. regions, which may reflect structural racism (e.g., Jim Crow laws, *de jure* segregation of schools), childhood socioeconomic conditions, and dietary norms, Southern birthplace and residence at baseline were included as covariates. Southern birthplace and residence at baseline were both dichotomized (0=Northeast, Midwest, or West; 1=South). In Aim 1, the dichotomous race variable was also included as a covariate; in Aim 2, this variable was the exposure in the mediation model.

Analytic Plan

Descriptive statistics and bivariate analyses were conducted in SPSS (Version 28, IBM Corporation, 2021) with independent samples *t*-tests and chi-square tests. Correlations between the psychosocial stressors were examined to rule out multicollinearity. Memory trajectories from 2010 or 2012 to 2018 were estimated using latent growth curve modeling with maximum likelihood estimation in MPlus (Version 8, Muthen & Muthen). Time represented years since baseline (2010 or 2012). Participants had an average of 3.48 (*SD*=1.35) time points of memory data over five possible waves. Latent variables represented initial memory performance (intercept) and rate of change in memory over the follow-up period (linear slope). Linear regression analyses and mediation models were conducted with structural equation modeling in

MPlus. Model fit was evaluated with widely used criteria (CFI>.95, RMSEA<.06, TLI>.90; Hu & Bentler, 1999).

For Aim 1, latent memory outcomes were regressed on each psychosocial stressor and all covariates to examine whether interpersonal (everyday discrimination), community (neighborhood physical disorder), and societal (subjective societal status) stressors were associated with memory. The psychosocial stress variables were allowed to covary given theory suggesting these constructs are linked (Adkins-Jackson et al., 2023; Hill et al., 2015). For Aim 2, a mediation model computed direct and indirect effects of race on latent memory outcomes to examine whether psychosocial stressors mediated racial disparities in memory. Indirect effects corresponded to the effects of race on memory intercept or slope through each psychosocial stressor, independent of covariates. Direct effects corresponded to race-memory associations independent of all psychosocial stressors and covariates. Total effects corresponded to the sum of the direct and indirect effects and represent racial differences in memory outcomes controlling only for covariates.

Logistic regressions examined whether there was differential attrition after Wave 1 by race and/or baseline memory performance. Attrition was coded as a binary variable with 1 indicating the participant had dropped out *or* transitioned to proxy assessments after Wave 1 and 0 indicating the participant remained in the study for all waves. Models were adjusted for age and sex.

Sensitivity Analyses

Depressive Symptoms

Given that self-reported psychosocial stressors may be influenced by depressive symptoms, which are also associated with worse memory, we conducted a sensitivity analysis

controlling for depressive symptoms. Because depressive symptoms could be alternatively conceptualized as a mediator of stress-memory associations, we added depressive symptoms in sensitivity analyses as opposed to in the primary model. Depressive symptoms were measured at baseline using the eight-item HRS version of the Center for Epidemiological Studies-Depression Scale (CES-D; Radloff, 1977; Steffick et al., 2000).

Proxy-Imputed Memory Scores

Primary analyses include only direct, performance-based measures of cognition to maintain consistency with prior HRS research examining racially-patterned psychosocial factors and cognition (Morris et al., 2022; Zahodne et al., 2018, 2019). However, the HRS also collects information on cognitive status from proxy informants (e.g., spouse, family member) using standardized measures (i.e., rating of memory, Jorm Informant Questionnaire for Cognitive Decline [IQCODE]) if the participant appears too impaired to undergo cognitive testing (Jorm, 1994). We used proxy-imputed memory scores, based on proxy ratings of participants' memory and reports of cognitive impairment on the IQCODE, created by Wu et al. (2013), as the outcome variable in a sensitivity analysis to retain participants who were likely to be more cognitively impaired.

Results

Table 1 summarizes baseline characteristics and unadjusted group differences. Compared to White participants, Black participants reported more everyday discrimination, more neighborhood physical disorder, and lower subjective societal status. Black participants had lower baseline memory performance than White participants. The structural equation model used to examine Aims 1 and 2 fit well (CFI=.988, RMSEA=.023, 90%CI:[.021, .025], TLI=.974). There were no exposure-mediator interactions. Unadjusted interrcorrelations between the three

psychosocial stressors were small, suggesting minimal concern for multicollinearity (*r*s .212—.248).

Supplementary Table 1 demonstrates that after adjusting for age, sex, and baseline memory, there were no racial differences in likelihood of attrition or conversion to proxy. Higher baseline memory performance was associated with lower odds of dropping out or converting to proxy after Wave 1. Participants who dropped out at any time point had lower baseline memory than participants who remained in the study for all possible waves (Supplementary Table 2).

Aim 1: Psychosocial Stress-Memory Associations

As shown in Table 2 and Figure 1, more everyday discrimination, more neighborhood physical disorder, and lower subjective societal status were associated with worse initial memory. There were no associations between stressors and memory slope.

Aim 2: Psychosocial Stressors as Mediators of Race-Memory Associations

Figure 1 and Table 3 summarize the total and indirect effects of race on memory through each psychosocial stressor. The total indirect effect of race on memory through all three mediators was significant, accounting for 7.9% of the Black-White difference in initial memory performance overall. Each stress variable uniquely mediated race-memory associations. Specifically, Black participants reported more everyday discrimination (2.1% of the total effect), more neighborhood physical disorder (4.8% of the total effect), and lower subjective societal status (1.0% of the total effect), each of which was independently associated with worse initial memory. There was no Black-White difference in rate of memory change (Table 2).

Sensitivity Analyses

Depressive Symptoms

Participants had an average of 1.39 depressive symptoms (*SD*=1.94; Range=0-8). Results from the sensitivity analysis adding depressive symptoms as a covariate to the primary model are summarized in Supplementary Figure 1. For Aim 1, associations between each stressor and initial memory were attenuated but remained significant. More depressive symptoms were independently associated with worse initial memory (Supplementary Figure 1) but not rate of memory change (β=–.023 [*SE*=.035], *p*=.507). For Aim 2, everyday discrimination (standardized indirect effect β=–.002 [*SE*=.001], *p*=.003) and neighborhood physical disorder (standardized indirect effect β=–.008 [*SE*=.002], *p*=.001) remained significant, although attenuated, mediators of the racial disparity in initial memory. Subjective societal status was no longer a significant mediator of the racial disparity in initial memory because there was no racial difference in subjective societal status when controlling for depressive symptoms.

Proxy-Imputed Memory Scores

There were no racial differences in likelihood of requiring proxy-imputed memory at any time point (χ^2=2.36, *df*=1, *p*=.124) or the number of waves at which participants had proxy informants (*t*[14624]=1.23, *p*=.221). Supplementary Figure 2 summarizes results from the sensitivity analysis using proxy-imputed memory scores as the outcome variable for participants missing objective memory scores. For Aim 1, more everyday discrimination and lower subjective societal status continued to be associated with worse initial memory. In contrast to primary analyses, more everyday discrimination and lower subjective societal status were also associated with a faster rate of memory decline. Neighborhood physical disorder was not associated with initial memory (β=.007 [*SE*=.008], *p* =.420) or change in memory (β=–.022 [*SE*=.015], *p*=.142).

For Aim 2, a Black-White disparity in rate of memory change emerged, in addition to the Black-White disparity in initial memory (Supplementary Figure 2). Racial differences in the psychosocial stressors were consistent with those demonstrated in the primary model. Only everyday discrimination partially mediated the racial disparity in initial memory (standardized indirect effect β=–.002 [*SE*=.001], p<.001) and in memory decline (standardized indirect effect β=–.002 [*SE*=.001], p<.001).

Discussion

In this longitudinal study of a U.S. national sample of Black and White adults aged 51 and over, we found that greater psychosocial stress in interpersonal, community, and societal domains was uniquely associated with worse initial memory. Together, everyday discrimination, neighborhood physical disorder, and subjective societal status partially mediated the observed Black-White disparity in initial memory after accounting for years of education, wealth, parental education, Southern birthplace, and Southern residence at baseline. These results support the study's initial hypotheses, providing preliminary evidence that psychosocial stressors across multiple levels of influence simultaneously contribute to racial disparities in memory.

Results from Aim 1 estimating associations involving everyday discrimination, neighborhood physical disorder, and subjective societal status demonstrated that each stressor is uniquely associated with initial memory, but not memory change over time. This finding is consistent with prior literature demonstrating that more everyday discrimination (Barnes et al., 2012; Zahodne et al., 2019), more neighborhood physical disorder (Wong & Wang, 2022; Zaheed et al., 2019), and lower subjective societal status (Kobayashi et al., 2021; Lindert et al., 2022; Zahodne et al., 2018) are associated with worse cognitive health. These findings are also consistent with the theoretical framework of persistent inequality, wherein inequality over the

life course predisposes Black older adults to worse health outcomes later on (Ferraro & Farmer, 1996).

The unique associations between each of these factors and memory represents an important extension of prior literature, which has predominantly studied these constructs individually as opposed to modeling them simultaneously. Considering these interpersonal, community, and societal-level stressors in context with one another is essential to understanding the cross-system effects of racially-patterned stressors, which is an important first step in better estimation of cognitive effects of elements of structural racism (Adkins-Jackson et al., 2023). Sensitivity analyses demonstrated that depressive symptoms may confound or partially mediate psychosocial stress-memory associations, as evidenced by weaker associations between the psychosocial stressors and memory after controlling for depressive symptoms. Future research should further examine mechanisms, including depressive symptoms, that could underlie psychosocial stress-memory associations.

Aim 2 examined whether everyday discrimination, neighborhood physical disorder, and subjective societal status mediated racial disparities in memory. In primary models using only direct, performance-based memory tests, there was a racial disparity in initial memory but not memory change, consistent with previous work on racial disparities in directly observed cognitive performance (Manly & Mungas, 2015). Racial disparities may be most evident in initial memory because of life course accumulation of psychosocial disadvantage, which is most evident for initial cognitive level than subsequent rate of change (controlling for initial level). Results demonstrated that stress uniquely mediated the observed Black-White disparity in initial memory performance. Combined, these interpersonal, community, and societal-level stressors accounted for 7.9% of the Black-White disparity in initial memory. This finding is consistent

with prior research demonstrating that psychosocial factors (e.g., chronic stress, discrimination, locus of control) mediate racial disparities in cognition among older adults (Morris et al., 2022; Zaheed et al., 2021; Zahodne et al., 2019, 2020) and extends existing research to include simultaneous mediators at multiple contextual levels. While there was no mediation of racial disparities in rate of memory change, findings that racially patterned psychosocial stressors mediated racial disparities in initial memory remain highly relevant to ADRD risk, given that baseline memory is a strong predictor of later conversion to dementia (Silva et al., 2020), and Black-White disparities in ADRD risk more strongly reflect differences in the level of cognitive health entering later life than the rates of cognitive decline during later life. This is because individuals who start off with worse cognitive health will cross the dementia threshold sooner than individuals who start off with better cognitive health.

When proxy-imputed memory scores were used as the outcome variable, more everyday discrimination and lower subjective societal status were uniquely associated with both worse initial memory *and* faster rates of memory decline; however, neighborhood physical disorder was no longer associated with initial memory. Everyday discrimination remained a mediator of the racial disparity in initial memory *and* of the racial disparity in memory decline that emerged upon incorporating proxy-imputed memory scores. Finding slope effects only after extending the floor of measurable memory decline by including participants who required proxy-imputed memory scores suggests that decline observed in primary analyses with only direct memory assessments was not sufficient to detect association with memory change. These findings suggest that including more cognitively impaired participants improved our ability to detect the negative cognitive effects of everyday discrimination over time and provide further evidence that

everyday discrimination is a major psychosocial stressor that may predispose Black Americans to higher ADRD risk (Barnes et al., 2012; Zahodne et al., 2019).

With regard to the relative contributions of the three psychosocial stressors examined in the present study, neighborhood physical disorder mediated more of the Black-White disparities in initial memory performance in primary models. While associations between psychosocial stressors and initial memory were similar in magnitude across the three psychosocial stressors examined, the effect size of the Black-White disparity in neighborhood physical disorder was larger than that of everyday discrimination or subjective societal status. The finding that neighborhood physical disorder mediated more of the Black-White disparities than everyday discrimination helps address calls to examine elements of structural racism beyond interpersonal (i.e., everyday) discrimination (Adkins-Jackson et al., 2023; Dean & Thorpe, 2022; Williams et al., 2019). The difference in neighborhood physical disorder between racial groups in the present sample provides evidence that the legacy of redlining and ongoing systemic, racially biased disinvestment in Black neighborhoods continues today; thus, factors beyond everyday discrimination must be considered when investigating racial inequities in ADRD.

Because neighborhood physical disorder mediated the largest portion of the observed racial disparities in initial memory, neighborhood-level interventions may be particularly effective to address racial inequity in ADRD risk. Prior research suggests that access to green space/parks, recreational spaces, retail/services, and walkability are associated with better cognition among older adults (Finlay et al., 2021). However, because of the legacy of redlining and continued racial bias in neighborhood investment, predominantly Black neighborhoods often lack many of these health-promoting amenities that have been shown to protect against ADRD risk (Lee et al., 2022). Thus, systemic interventions aimed at improving neighborhood

investment and increasing access to health-promoting resources in primarily Black neighborhoods may contribute to alleviating racial disparities in ADRD prevalence and risk.

It is important to note, however, that neighborhood physical disorder was not associated with initial proxy-imputed memory or rate of proxy-imputed decline, suggesting that among participants who are likely to be more cognitively impaired (i.e., who required proxy-imputed memory scores), effects of neighborhood physical disorder may be less relevant, perhaps due to disengagement with their neighborhood leading to "protection" from neighborhood physical disorder. This diminished impact of detrimental effects of neighborhood physical disorder among the most cognitively impaired may be due to several factors, including isolation that prevents cognitively impaired individuals from interacting with their neighborhoods as frequently as individuals with better cognitive health (Aartsen et al., 2004).

The present study has important limitations to consider. First, memory was assessed using only a single list-learning task, and while prior research suggests this measure is an accurate indicator of dementia risk (Crimmins et al., 2011), neuropsychological assessment and/or incorporating consensus diagnoses of ADRD may improve accuracy of findings. Future studies may improve upon this limitation by examining additional cognitive domains and/or clinical diagnosis of ADRD. Second, assessment of the psychosocial stressors was limited to late life. While late-life assessment of psychosocial stress likely reflects cumulative experiences across the life course, accounting for interpersonal, community, and societal-level stressors at different life stages would provide further context regarding critical developmental periods during which stress may be particularly detrimental to cognition.

Third, the psychosocial stress measures used were self-report in nature, may be subject to reporting bias, and may also be limited in their ability to capture an individual's perception of

structural racism. However, it is notable that results were similar when controlling for depressive symptoms. Further, our finding that the effect size of group differences in neighborhood physical disorder were larger than that of other psychosocial stressors may be an artifact of measurement; perhaps neighborhood physical disorder is psychometrically-sound measure of the construct it is intended to measure (i.e., disadvantage, disinvestment) than the other psychosocial stressors utilized in this study. Future research should prioritize the further development of rigorous measures of interpersonal and societal-level stressors. Fourth, analyses examining predictors of attrition demonstrated that worse baseline memory was associated with higher likelihood of attrition or conversion to proxy memory assessments, suggesting that primary estimates of whether psychosocial stressors mediated racial disparities in memory may be underestimated. Indeed, sensitivity analyses including proxy-imputed memory assessments revealed a racial disparity in memory slope that was partially mediated by everyday discrimination.

Finally, growing research points to several unique strengths among older Black Americans that may counteract the negative effects of racially patterned contextual stressors on mental and cognitive health (e.g., stress appraisal, religious involvement; Kraal et al., 2019; Morris et al., 2022). The present study did not incorporate aspects of resilience that are important to consider when examining racial disparities in ADRD risk. Future research should expand on these preliminary findings by also examining resilience factors.

Despite the study's limitations, the finding that everyday discrimination, neighborhood physical disorder, and subjective societal status mediate racial disparities in memory provide guidance for interventions aimed at improving health equity in cognitive aging. This study has several strengths, notably in its use of a national, longitudinal sample of older Black and White Americans from the HRS, rigorous modeling of memory trajectories, comprehensive covariates,

and sensitivity analyses to address potential confounding by depressive symptoms and attrition bias due to potential cognitive impairment. Another strength of the present study is its simultaneous modeling of interrelated, racially patterned psychosocial stressors that are theoretically linked but rarely studied in context with one another.

To conclude, the present study identified unique associations between interpersonal, community, and societal level stressors with memory among older Black and White Americans. These psychosocial stressors account for a portion of Black-White disparities in memory, which points to the need for interventions at different contextual levels to promote racial health equity in ADRD. This study contributes to calls for more rigorous research examining aspects of structural racism and their association with ADRD risk above and beyond interpersonal discrimination. Future work will focus on identifying mechanisms underlying these psychosocial stress-cognitive health associations to uncover additional intervention targets for health equity.

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Conflict of Interest

We have no conflicts of interests to disclose.

Data Availability

This study was not pre-registered. Data from the Health and Retirement Study is publicly available at https://hrs.isr.umich.edu/. Analytic methods have not yet been published.

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Table 1. Baseline sample characteristics.

Predictor (Range)	Entire Sample (*N*=14,199) *M* (SD) or %	Black (*n*=2,808) 19.80% *M* (SD) or %	White (*n*=11,391) 80.20% *M* (SD) or %	Unadjusted Group Differences[b] *t* or X^2	Effect Size Cohen's *d* or Cramer's *V* [c]
Everyday Discrimination (1-6)	1.53 (.686)	1.68 (.810)	1.50 (.656)	–10.40*	–.271
Neighborhood physical disorder (1-7)	2.51 (1.39)	3.31 (1.59)	2.36 (1.30)	–27.28*	–.706
Subjective societal status (1-10)	6.44 (1.74)	5.92 (1.90)	6.52 (1.69)	12.42*	.348
Age (51-101)	68.32 (10.77)	64.61 (9.90)	69.23 (10.78)	20.68*	.436
Years of Education (0-17)	13.26 (2.52)	12.60 (2.74)	13.42 (2.43)	15.57*	.328
Female sex	57.80%	62.32%	56.69%	29.35*	.045
2012 baseline year	47.50%	48.08%	47.31%	.532	.006
Wealth (–1,495,000-27,757,000)[a]	468,949.11 (1,042,240.13)	121,246.02 (266,055.29)	554,661.54 (1,139,941.43)	20.01*	.422
Average parental education (0-17)	10.26 (3.12)	9.13 (3.32)	10.54 (3.00)	21.84*	.460
Southern birthplace	37.10%	73.82%	28.04%	2023.73*	.378
Southern residence at baseline	41.40%	58.37%	37.26%	413.75*	.171
Wave 1 memory (–2.68-2.84)	.031 (.93)	–.222 (.869)	.095 (.938)	16.11*	.343

[a] Wealth was self-report of all assets (e.g., income, savings, real estate) minus all debts (e.g., loans, credit card debt) and is reported in U.S. dollars.
[b] Differences indicate results of independent samples t-tests or X2 tests, with * indicating $p < .05$.
[c] Cohen's d was used as the effect size metric for continuous variables, and Cramer's V was used as the effect size metric for categorical variables.

Table 2. Associations between psychosocial stressors and memory outcomes (*N*=14,199)

	Initial Memory	Rate of Memory Change
Predictor	*β (SE)*	*β (SE)*
Everyday discrimination	–.063 (.011)*	.007 (.038)
Neighborhood physical disorder	–.042 (.011)*	–.028 (.039)
Subjective societal status	.048 (.011)*	.045 (.042)
Black race	–.174 (.010)*	–.007 (.036)
Age	–.470 (.009)*	–.622 (.068)*
Years of education	.283 (.010)*	–.051 (.038)
Female sex	.214 (.009)*	–.011 (.032)
2012 baseline year	.003 (.009)	.062 (.035)
Wealth	.033 (.009)*	.074 (.037)*
Parental education	.061 (.010)*	.018 (.037)
Southern birthplace	–.026 (.011)*	–.003 (.042)
Southern residence at baseline wave	–.004 (.011)	.078 (.040)

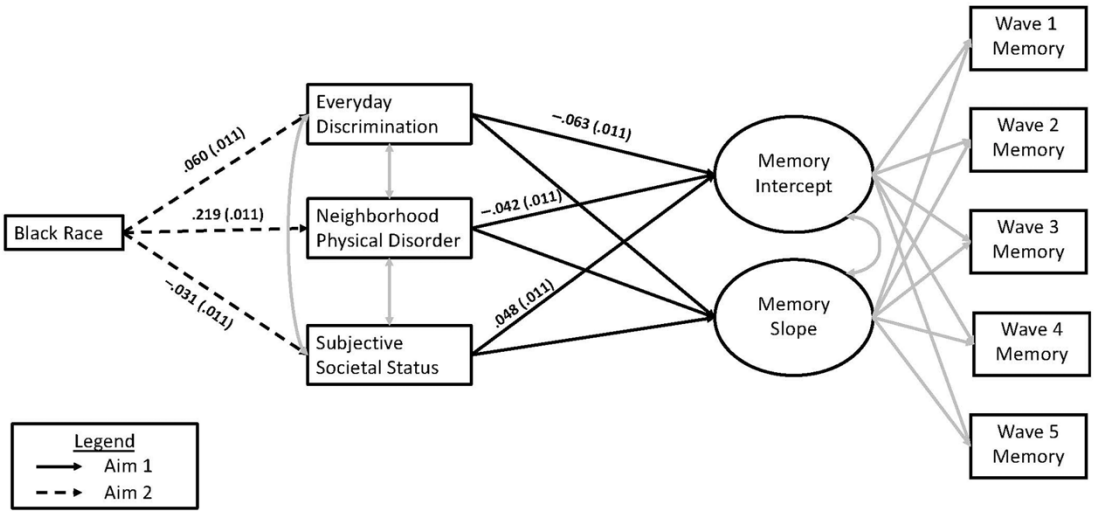
Note. Covariates included in all models: age, years of education, female sex, 2012 baseline year, wealth, parental education, Southern birthplace, and Southern residence at baseline wave.
* $p < .05$

Table 3. Standardized mediation estimates of model examining extent to which everyday discrimination, neighborhood physical disorder, and subjective societal status mediate racial disparities in longitudinal memory performance (*N*=14,199)

Mediation Pathway	Initial Memory	Rate of Memory Change
	β (SE)	*β (SE)*
Full Model – Total Effect	–.189 (.010)*	–.014 (.035)
Full Model – Total Indirect Effect	.015 (.003)*	–.007 (.008)
Indirect effect of race on memory through discrimination	–.004 (.001)*	.000 (.002)
Indirect effect of race on memory through neighborhood physical disorder	–.009 (.002)*	–.006 (.009)
Indirect effect of race on memory through subjective societal status	–.002 (.001)*	–.001 (.001)

Note. Covariates included in all models: age, years of education, female sex, 2012 baseline year, wealth, parental education, Southern birthplace, and Southern residence at baseline wave. Model allows all mediators to covary.
*$p < .05$.

Figure 1. Conceptual model and path analysis results.



Note. Parameter estimates, reported in standardized β *(SE)* are only provided for significant paths. Covariates (age, sex, years of education, wealth, average parental education, Southern birthplace, Southern residence at baseline year, and baseline year in HRS) not shown for simplicity. All mediators were allowed to covary.

Alt Text: Model pathway figure demonstrating that each psychosocial stressor independently mediates racial disparities in initial memory, but not memory slope, which was modeled using a latent growth curve model over five waves.

Supplementary Material

Supplementary Table 1. Logistic regression estimates examining predictors of dropout or conversion to proxy memory assessment (N=13,816)[1].

	B (SE)[2]	Odds Ratio	*p*
Constant	–1.06 (.143)	.346	< .001
Age	.030 (.002)	1.03	< .001
Female sex	–.027 (.040)	.973	.493
Black race	–.029 (.050)	.971	.556
Wave 1 memory	–.299 (.024)	.742	< .001

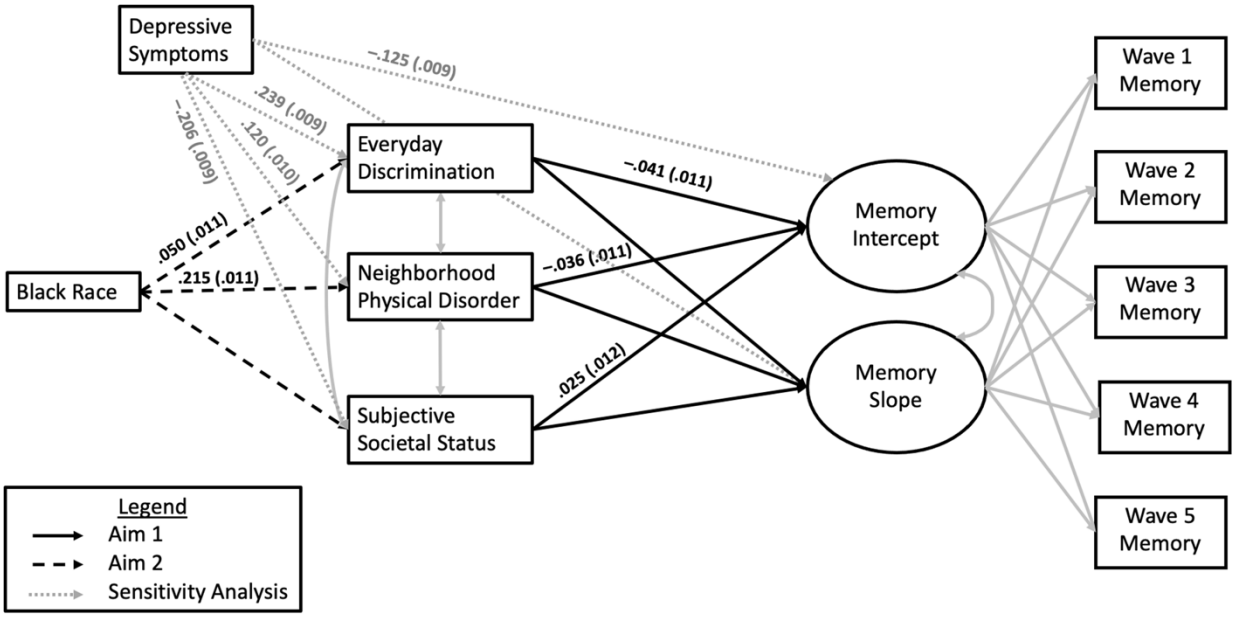
Note.
[1]383 participants were missing all memory outcomes.
[2]Regression estimates are unstandardized.

Supplementary Table 2. Baseline memory as a function of attrition or conversion to proxy memory assessment by racial group (N=13,816)[1].

	Baseline Memory (*M* [*SD*])		Mean
Dropout/Proxy Status	Black (n=2,757)	White (n=11,059)	Difference
Remained in Study with Direct Memory Assessments	–.073 (.777)	.365 (.793)	–.437*
Dropped Out or Converted to Proxy After Wave 1	–.286 (.897)	–.013 (.968)	–.273*
Mean Difference	.213*	.377*	

Note.
[1]383 participants were missing all memory outcomes.
$F_{(3, 13812)} = 228.51$, $p < .001$
* indicates $p < .05$ with least significant difference post-hoc corrections.

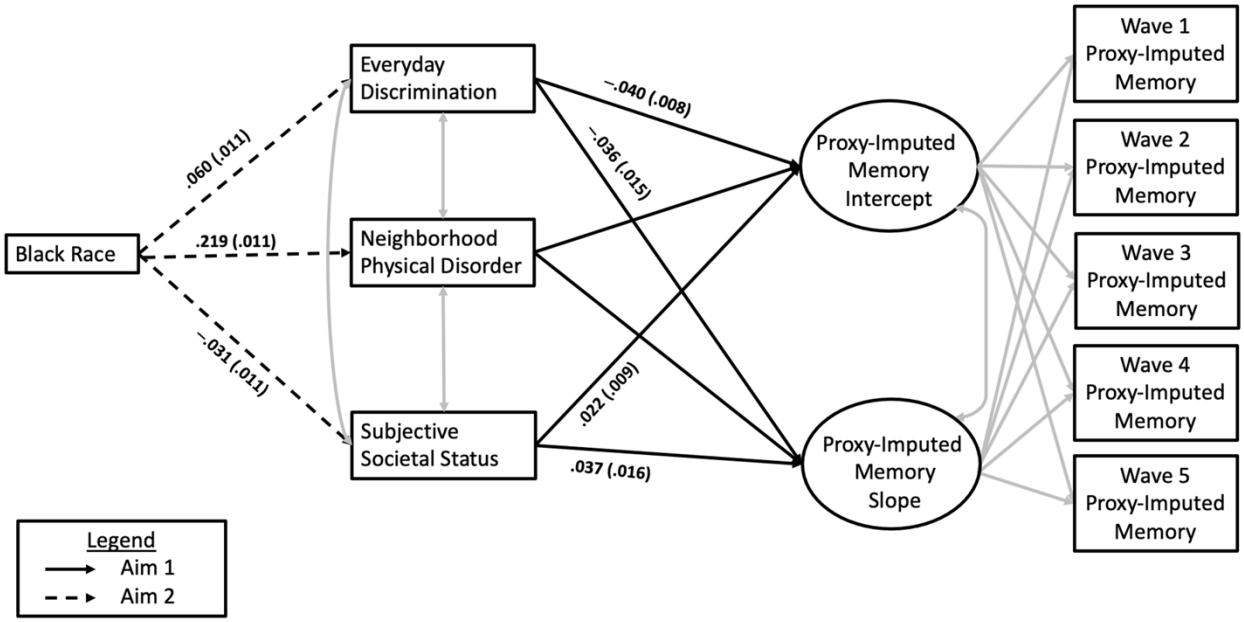
Supplementary Figure 1. Mediation path analysis results for sensitivity analysis covarying for depressive symptoms (N=13,879).



Note. Parameter estimates, reported in standardized β *(SE),* are only provided for significant paths. Covariates aside from depressive symptoms (age, sex, years of education, wealth, average parental education, Southern birthplace, Southern residence at baseline year, and baseline year in HRS) not shown for simplicity. All mediators were allowed to covary.

Alt Text: Supplementary model pathway figure demonstrating that when depressive symptoms were added as a covariate, everyday discrimination and neighborhood physical disorder remained mediators of racial disparities in initial memory.

Supplementary Figure 2. Mediation path analysis results for sensitivity analysis using proxy-imputed memory scores as the outcome variables (N=14,626).



Note. Parameter estimates, reported in standardized *β (SE)*, are only provided for significant paths. Covariates (age, sex, years of education, wealth, average parental education, Southern birthplace, Southern residence at baseline year, and baseline year in HRS) not shown for simplicity. All mediators were allowed to covary.

Alt Text: Supplementary model pathway figure demonstrating that when proxy-imputed initial memory and memory slope were utilized as the outcome variables, more everyday discrimination partially explained worse initial memory *and* faster memory decline among Black participants.