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Research Article

Diminished Returns of Higher Parental Education on Cognition for Black Adults in Middle and Later Life

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Abstract

Objectives: Mounting evidence suggests that the protective effects of one's own higher socioeconomic status (SES) on health are diminished among minoritized racial/ethnic groups in the United States. This study extends this area of research to childhood SES and cognition in middle and later life, focusing on the protective effects of higher parental education among non-Hispanic Black and White adults.

Methods: Harmonizing data from individuals ages 50 and older across the Health and Retirement Study, the Study of Midlife in the United States, and the National Social Life, Health, and Aging Project, we examine whether associations between parental education and two measures of cognition (episodic memory and global cognition) are moderated by racialized identity (non-Hispanic White or Black) using a random-effects individual participant data meta-analysis approach.

Results: Findings indicated a small, but robust, protective effect of higher parental education on both episodic memory and global cognition among adults identified as White. Among adults identified as Black, there was no association between parental education and either cognitive outcome.

Discussion: This study provides evidence that the protective effect of higher parental education on cognition is not the same across racialized populations, consistent with the theory of Minority Diminished Returns. As scholars continue calls for life-course-oriented efforts to reduce racialized cognitive disparities, it is important to consider early-life risk and protective factors in the context of racism.

Keywords: Childhood contexts, Cognitive aging, Health disparity, Life course

Scholarly interest in elucidating the risk and protective factors for healthy cognitive aging has increasingly oriented to the influence of contexts from early periods of the life course (Livingston et al., 2017). Although there is an established body of literature that supports the influence of early-life risk and protective factors on later-life cognitive outcomes (i.e., the "long arm" of childhood; Haas, 2008), much of this research has not considered how racism serves as a fundamental social context for health and human development. Studies of early-life risk and protective factors for cognitive aging have largely been conducted on predominately White samples in the United States, which precludes explicit examination of how racism may underlie these associations. This sociomethodological limitation is especially concerning given that individuals identified as Black experience two to three times the risk of Alzheimer's disease and related dementias (ADRD) in comparison to their counterparts identified as White (Potter et al., 2009).

Although empirical evidence supports that ADRD may be partially preventable in the general population (Livingston et al., 2017), few studies have examined if early-life risk and protective factors are equally salient across racialized populations. Assumptions that risk and protection are relevant across racialized groups limit the implications of research for addressing health disparities, especially given that psychosocial risk factors across the life course are embedded within contexts stratified by race (Ferrer et al., 2017). To address this overall gap in the literature, this paper explores if racialized identities moderate associations between parental education, a component of childhood socioeconomic status (cSES), and later-life cognition using data from three population health studies in the United States.

Childhood Socioeconomic Status and Later Life Cognition

Childhood SES refers to a family's capacity to access material and nonmaterial resources (Rakesh et al., 2023). A growing body of evidence from studies conducted both in the United States (Greenfield & Moorman, 2019; Melrose et al., 2015; Rogers et al., 2009) and internationally (Horvat et al., 2014; Wang et al., 2017; Zhang et al., 2017) has found that higher cSES is associated with better later-life cognition. In general, these studies have found that cSES is associated with better cognitive performance levels, but does not necessarily change over time (Greenfield & Moorman, 2019) and that this association may be specific to particular domains of cognition (Greenfield & Moorman, 2019; Melrose et al., 2015; Rogers et al., 2009).

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Drawing from life course epidemiology (Ben-Shlomo & Kuh, 2002), scholars contend that there are two general pathways through which cSES affects later-life cognition. First, a social pathways model contends that the benefits of higher cSES lead to trajectories of higher adult SES and other health-promoting resources at subsequent periods of the life course (Lawrence, 2017), which, in turn, lead to better cognition in later life. Second, some scholars theorize that childhood represents a sensitive period during which exposures to risk and protective factors have immediate ramifications to health that last decades later (Lyu & Burr, 2016). The protective effects of higher cSES could be due to more stimulating environments, whereas the risk associated with lower cSES could be due to environmental exposures, poorer nutrition, or stressful environments (Glymour & Manly, 2008). The empirical evidence to date suggests that both social pathways and sensitive period effects account, in part, for associations between cSES and later life cognition for the population at large (e.g., Zhang et al., 2020).

Theory of Minority Diminished Returns and Cognition

Although the above-reviewed studies contribute evidence that cSES influences later life cognition, they largely assume that the protective effects of high cSES are universal across racialized groups. The theory of Minority Diminished Returns (MDR), however, suggests that the protective effects of higher SES might be lower among marginalized racial groups across a variety of outcomes (Assari, 2018a, 2020). This theory posits that the benefits of high SES on health are diminished among marginalized racial groups because of other structural barriers stemming from racism, including inequitable access to high-quality education, the labor market, and safe and healthy communities (Akhlaghipour & Assari, 2020).

Few studies have examined if the protective effects of cSES on cognition are diminished among marginalized racial groups. One study by Akhlaghipour & Assari (2020) found that the influence of parental education, but not household income, on working memory among adolescents was less pronounced among participants identified as Black, in comparison to their peers identified as White. Similarly, a study of adolescents found that a composite measure of cSES was associated with diminished returns in terms of attention (Assari et al., 2020) and matrix reasoning (Assari & Boyce, 2021) for youth identified as Black not for those identified as White. Further, a study by Reynolds and colleagues (2022) found that the influence of cSES on later-life cognition was influenced by racialized and geographic contexts. Specifically, the authors found that the protective role of cSES was most pronounced among non-Hispanic White participants who lived their childhood in the Southern United States, but that cSES did not buffer against the Southern disadvantage among participants identified as Black.

The theory of MDR contends that racist structures can explain the health disparities between racialized groups, in that social mobility is more difficult for families identified as Black in the context of societalwide racism (Assari & Caldwell, 2021). For clarity, the term *racism* refers to the differential and pejorative treatment, both interpersonally and at the societal level, of people who are racialized as "of color" based on untenable beliefs of racial inferiority, which leads to and sustains oppression (Braveman et al., 2022). *Systemic racism* emphasizes the role of systems (e.g., education and healthcare) and their contributions to the oppression of people from historically marginalized racial groups; in comparison, *structural racism* emphasizes the role of structures (i.e., policies, practices, laws, and norms) that are embedded within and between systems as drivers of continued oppression and privilege (Braveman et al., 2022). In the current paper, we contend that racism, structural and systematic, is a fundamental cause of health disparities, similar to SES, as it produces and reinforces health disparities by restricting access to resources among marginalized populations (Phelan & Link, 2015).

Focus of the Current Study

Although there is a robust literature on the association between cSES and later life cognition, few studies have examined the relationship between cSES and later life cognition across distinct racialized groups. This gap may be, in part, due to sampling constraints of large social surveys that include both measures of childhood social contexts and later-life cognition. Moderation is difficult to detect and can require larger samples to achieve statistical power (McClelland & Judd, 1993). Although population health studies in the United States offer relatively large sample sizes, participants are predominately White, and studies face difficulty with the recruitment and retention of individuals from minoritized racial groups (Ofstedal & Weir, 2011; Radler & Ryff, 2010). Given the relatively small effect size of the relationship between childhood SES and later life cognition (see Greenfield & Moorman, 2019, for discussion), it follows that studies examining whether racialized identities moderate this association might require larger samples.

Given these considerations, the current study draws on individual participant data (IPD) meta-analysis to pool participants across three U.S. population health studies with participants identified as Black or White racialized identities and that uniquely include measures of both parental education and later life cognition. We test the following hypothesis: Higher parental education will be associated with higher levels of cognition in adulthood, but this association will be weaker among participants identified as Black in comparison to participants identified as White.

Method

Data Sources

This secondary data analysis leverages data from the Health and Retirement Study (HRS), the Study of Midlife in the United States (MIDUS), and the National Social Life, Health, and Aging Project (NSHAP). It was approved by the Intuitional Review Board of Rutgers University.

Health and Retirement Study is a biannual, longitudinal survey of adults ages 51 and older and their spouses. Periodically, the HRS adds a new birth cohort to its sample; the last cohort addition took place in 2016. In the current study, cognition data were obtained in 2016. Other study variables were obtained from the cross-wave tracker files, which include data from 1992 to 2016 (for more information about this study, refer to Sonnega et al., 2014).

Midlife in the United States is a nationally representative sample of adults born between 1920 and 1969 (i.e., ages 25 to 74 in 1994). Data were initially collected in 1994 and include two follow-up waves (i.e., the core sample). During the third

wave of data collection (2013–2016), an additional sample of participants between 25 and 74 (i.e., birth years 1939–1991) was drawn. To increase the number of participants identified as Black, this study recruited an oversample of participants with Black racialized identities from Milwaukee. Data used in the current study include cognition data from Wave 3 encompassing the core sample, the refresher sample, and Milwaukee samples. Due to the large age range of participants, only individuals ages 50 and over were included as part of the current study (for more information about MIDUS, refer to Radler, 2014).

National Social Life, Health, and Aging Project is a nationally representative, longitudinal study of adults in the United States. The original sample included adults ages 57 to 85 (i.e., birth years 1920–1947). Additional follow-up assessments have been performed, including a refresher sample of individuals from the Baby Boom cohort born between 1948 and 1965. The current study uses cognition data from Wave 3 (2015–2016), which included the refresher sample (for more information about NSHAP, refer to Suzman, 2009).

Measures

Cognition

We included two measures of cognition, both of which were available across the three data sets. First, *global cognition* refers to overall cognitive performance based on a composite score regarding related, yet distinct, domains of functioning. It is generally measured as a composite of multiple cognitive domains and is often used as part of assessment to screen for ADRD (Riello et al., 2021). Measures of global cognition varied widely across the three studies and are detailed in Supplementary Table 1.

Second, *episodic memory*, or short-term memory, is partially localized to the hippocampus and tends to show the greatest variation in later life due to neurodegenerative cognitive changes (D'Amico et al., 2022; Halliday, 2017). It is generally measured as both immediate and delayed recall. Across the three studies, measures of episodic memory involved an auditory immediate recall trial, as well as a delayed trial. Health and Retirement Study used a 10-word list, MIDUS used a 15-word list, and NSHAP used a 5-word list. Both the immediate and delayed recall scores were added together. For both global cognition and episodic memory, scores were *c*-centered by study (see "Analytic Strategy" for additional information).

Parental education

Supplementary Table 1 displays information on how parental education was measured across each study. This table also indicates how scores were qualitatively harmonized, which involved the use of a logical algorithm to construct mutually exclusive categories across studies. For the analysis, we dichotomized this variable to indicate less than a high school education or a high school education or higher. The higher level of education between mothers and fathers was used in cases where both were reported. If participants had one of their parent's data as missing, then the data from the other parent was used. Given that parents of participants were likely born in the early part of the 20th century and given low high school enrollment rates during this period, it follows that educational advantage was likely conferred to those with a high school education or higher. For example, only 14.3% of children ages 14–17 were enrolled in high school between 1909 and 1910 in the United States, compared to 50.7% in 1929–1930 (Snyder & Dillow, 2007).

Racialized identity

The wording of questions to assess participants' self-report race/ethnicity varied across studies and therefore were qualitatively harmonized (refer to Supplementary Table 1). We created a binary indicator if participants identified as non-Hispanic Black or non-Hispanic White.

Covariates

Covariates included sex, educational attainment, and age. Sex—assessed the same across all studies and therefore not requiring harmonization—was measured as a dichotomous indicator of whether the participant identified as either male or female. Participants' own educational attainment measures varied across studies and were qualitatively harmonized (refer to Supplementary Table 1). We created a categorical variable to indicate (1) less than a high school degree, (2) high school completion, (3) some education beyond high school without a 4-year degree, and (4) a 4-year college degree or higher. Age, measured comparatively across studies, was a continuous measure.

Analytic Sample

Across all three studies, there were 18,992 participants who identified as non-Hispanic White or non-Hispanic Black with valid episodic memory and global cognition data. Missing data on the main independent variable, parental education, led to the exclusion of 1,507 participants. Participants under 50 years old were also excluded due to differing samples across studies, reducing the analytic sample by an additional 1,631 participants. As *c*-centering required participant's educational attainment, participants missing on this variable ($n = 26$) were excluded. The final sample included 15,828 participants (12,944 and 2,884 participants identified as White and Black, respectively).

Analytic Strategy

To facilitate comparison of different cognitive measures across studies, statistical harmonization was achieved by calculating *c*-scores based on strata encompassing gender, education, and age categories following the process of Griffith and colleagues (2013). C-scores were calculated by standardizing raw scores to the means of females with a high school education who were between 70 and 79 years old, by study. This stratum was chosen for *c*-centering because it represented the greatest number of participants overall and maximized the number of respondents across studies.

To test our hypothesis, we performed a one-stage IPD meta-analysis. A one-stage approach produces a single regression model and is comparable to results obtained in a two-stage approach (Riley et al., 2021); however, two-stage approaches do not allow for the calculation of simple slopes to facilitate the interpretation of interaction effects because they are based on aggregate data. In this approach, we followed the recommendations of Riley and colleagues (2021). We used a multilevel mixed-effects model, wherein participants were nested within a study. Next, we implemented random slopes for parental education and the interaction between parental education by racialized identity. All covariates (i.e., age, sex, and own education) were entered into the

fixed effects portion of the equation as centered by study to address aggregation bias. Although study-specific estimates can be biased downward due to the small number of studies included in the multilevel model, the restricted maximum likelihood (REML) approach mitigates this bias by accounting for the loss of degrees of freedom and is robust to outliers (Lin et al., 2013); more germane to the design of the current study, pooled effects can be reliability estimated with a small number of studies (Bryan & Jenkins, 2016). For study-specific results, we performed ordinary least squares regression by study.

Results

Sample Characteristics

Table 1 presents a full reporting of sample characteristics, including individual study sample characteristics. Pooled study participants were predominately female (56.79%) and non-Hispanic White (81.78%) with an average age of 68.45 years (*SD* = 11.26). Most participants obtained at least some college education or more (61.32%). Approximately 70% of the sample had one or more parents with a high school education. Statistically significant differences across studies were observed for all study variables at $p < .001$. In general, HRS participants, in comparison to those in MIDUS and NSHAP, had a greater proportion of participants identified as Black, higher parental education, higher respondent education, and higher levels of female representation. In addition, statistically significant differences by racialized identity were observed for all study variables at $p < .001$. In particular, participants identified as Black had lower cognitive scores, were more likely to have parents with less than a high school education, had lower educational attainment, were more likely to be female, and were younger in comparison to their counterparts identified as non-Hispanic White.

Global Cognition Pooled Results

The pooled main effects model indicated that having a parent with a high school education or more was associated with higher scores on global cognition ($b = 0.11$, $p < .001$). The interaction model suggests that, when pooled, this association was diminished among participants identified as Black relative to participants identified as White ($b = -0.15$, $p < .05$). A simple slopes test revealed that the association between parental education and global cognition was only statistically significant among participants identified as White ($b = 0.13$, $p < .001$) and not among participants identified as Black ($b = -0.02$, $p = .82$). For a complete reporting of results, refer to Table 2.

Episodic Memory Pooled Results

The main effects model indicated that having a parent with a high school education or more was associated with higher

Table 1. Sample Characteristics

Variable	HRS *N* = 9,730	MIDUS *N* = 3,690	NSHAP *N* = 2,408	Difference[b]	Participants identified as Black *N* = 2,884	Participants identified as White *N* = 14,207	Difference[b]
	M (*SD*)/%	*M* (*SD*)/%	*M* (*SD*)/%		M (*SD*)/%	*M* (*SD*)/%	
Global cognition[a]	−0.03 (1.11)	0.81 (1.27)	0.19 (1.01)	***	−0.42 (1.16)	0.34 (1.15)	***
Recall[a]	−0.06 (1.1)	0.3 (1.11)	−0.06 (0.97)	***	−0.29 (1.07)	0.09 (1.09)	***
Parental education				***			***
Less than high school	36.71	24.28	21.84		50.19	28.42	
High school or more	63.29	75.72	78.16		49.81	71.58	
Race				***			
White	77.28	90.79	86.17		0.00	100.00	
Black	22.72	9.21	13.83		100.00	0.00	
Educational attainment				***			***
Less than high school	12.91	5.01	5.81		18.10	8.18	
High school or GED	32.47	22.93	22.26		29.30	28.55	
Some college	25.73	29.27	37.79		31.41	27.72	
College or more	28.89	42.79	34.14		21.19	35.55	
Gender				***			***
Female	58.43	54.50	53.70		61.37	55.77	
Male	41.57	45.50	46.30		38.63	44.23	
Age (in years)	70.26 (11.75)[c]	64.17 (9.09)[d]	67.73 (10.38)[e]	***	64.40 (11.00)	69.36 (11.12)	***

Notes: GED = General Educational Development; HRS = Health and Retirement Study; MIDUS = Study of Midlife in the United States; NSHAP = National Social Life, Health, and Aging Project.
[a]Scores are *c*-centered to 70–79 year old females with a high school education or equivalent.
[b]Chi-square or ANOVA were used to test for differences across studies.
[c]Age range 50–95.
[d]Age range 50–92.
[e]Age range 50–107.
***$p < .001$.

Table 2. One-Stage Individual Participant Data Meta-Analysis Results for the Effect of Parental Education on Global Cognition and Episodic Memory

Variable	Global cognition		Episodic memory	
	Main effects	Interaction effects	Main effects	Interaction effects
Parental education (ref: Less than high school)	0.11***	0.13***	0.08***	0.11***
	(0.02)	(0.02)	(0.02)	(0.03)
Black (ref: White)	−0.79***	−0.64***	−0.55***	−0.45***
	(0.05)	(0.08)	(0.05)	(0.06)
Parental education × Black		−0.15*		−0.15***
		(0.07)		(0.04)
MIDUS × Black	−0.29***	−0.36***	0.06	0.04
	(0.08)	(0.10)	(0.08)	(0.08)
HRS × Black	0.17**	0.07	0.12*	0.10
	(0.06)	(0.08)	(0.06)	(0.06)
Education (ref: Less than high school)				
High school	0.49***	0.50***	0.37***	0.38***
	(0.08)	(0.08)	(0.08)	(0.08)
Some college	0.70***	0.71***	0.47***	0.48***
	(0.08)	(0.08)	(0.08)	(0.08)
College or Higher	1.07***	1.08***	0.66***	0.67***
	(0.08)	(0.08)	(0.08)	(0.08)
High school × MIDUS	−0.20	−0.21	−0.09	−0.10
	(0.12)	(0.12)	(0.12)	(0.12)
High school × HRS	0.10	0.09	0.00	0.00
	(0.09)	(0.09)	(0.09)	(0.09)
Some college × MIDUS	−0.02	−0.04	0.00	0.00
	(0.12)	(0.12)	(0.11)	(0.11)
Some college × HRS	0.11	0.10	0.10	0.09
	(0.09)	(0.09)	(0.09)	(0.09)
College × MIDUS	0.24*	0.23*	0.07	0.07
	(0.12)	(0.12)	(0.11)	(0.11)
College × HRS	0.07	0.07	0.20*	0.20*
	(0.09)	(0.09)	(0.09)	(0.09)
Age	−0.02***	−0.02***	−0.03***	−0.03***
	(0.00)	(0.00)	(0.00)	(0.00)
Age × MIDUS	−0.02***	−0.02***	−0.01*	−0.01*
	(0.00)	(0.00)	(0.00)	(0.00)
Age × HRS	−0.00	−0.00	−0.00	−0.00
	(0.00)	(0.00)	(0.00)	(0.00)
Male (ref: Female)	−0.16***	−0.16***	−0.40***	−0.39***
	(0.04)	(0.04)	(0.04)	(0.04)
Male × MIDUS	−0.01	−0.02	−0.25***	−0.25***
	(0.05)	(0.05)	(0.05)	(0.05)
Male × HRS	−0.01	−0.02	0.07	0.07
	(0.04)	(0.04)	(0.04)	(0.04)
NSHAP	−0.47***	−0.50***	−0.38***	−0.40***
	(0.08)	(0.08)	(0.08)	(0.08)
MIDUS	−0.11	−0.12	−0.07	−0.09
	(0.08)	(0.08)	(0.08)	(0.08)
HRS	−0.56***	−0.58***	−0.35***	−0.38***
	(0.03)	(0.03)	(0.03)	(0.03)

Notes: HRS = Health and Retirement Study; MIDUS = Study of Midlife in the United States; NSHAP = National Social Life, Health and Aging Project. Standard errors in parentheses.
***$p < .001$. **$p < .01$. *$p < .05$.

scores in episodic memory ($b = 0.08$, $p < .001$). In comparison, the interaction model suggested that this effect was diminished among participants identified as Black relative to participants identified as White ($b = -0.15$, $p < .001$). A simple slopes revealed that the association between parental education and episodic memory was only statistically significant among participants identified as White ($b = 0.11$, $p < .001$), but not participants identified as Black ($b = -0.04$, $p = .40$). For a complete reporting of results, refer to Table 2.

Sensitivity Analyses

In our first sensitivity analysis, we reestimated our models using a two-stage IPD meta-analysis approach. This approach is comparable to the one-stage approach (Riley et al., 2021). The added feature of this approach is that it allows for calculations of I^2, which quantifies the comparability of study samples (e.g., between-study heterogeneity), with lower percentages suggesting that studies can be pooled (Riley et al., 2021). In a two-stage IPD meta-analysis, regressions are performed by study, and effect sizes are calculated, which are then used in performing a traditional meta-analysis (Riley et al., 2021). Following the guidance of Riley et al. (2021), random effects and REML were selected to mitigate potential bias from loss of degrees of freedom and outliers. Interaction effects were assessed using a multiplicative interaction term between parental education and racialized identity. Results of this analysis were similar to those reported above. For interaction models, the I^2 was 47.2% and 0.0% for global cognition and episodic memory, respectively. These values suggest that caution should be used in interpreting the results for global cognition due to a moderate amount of variance being explained by between-study variability. (See discussion below for further interpretation.)

In our second sensitivity analysis, we relaxed the age restrictions on the analytic sample and included participants younger than 50 years old to take advantage of the full age range of the sample. The results were similar to those reported above. In our third sensitivity analysis, we added measures of history of stroke and history of hypertension as covariates due to their association with later life cognition and cSES (Becher et al., 2016; Deckers et al., 2020). In this analysis, the interaction between race and parental education was no longer significant in the model with global cognition as the outcome ($\theta = -0.14$, $p = .05$, $I^2 = 46.4\%$). In the fourth sensitivity analysis, we removed own educational attainment from the models as educational attainment could be considered a mediator. The results were similar to those previously reported in terms of direction and significance; however, the coefficients for parental education across all models were larger. In our next sensitivity analysis, we matched cases based on parental education by race to create a balanced sample in terms of the number of White and Black adults to address sample differences being the primary explanatory mechanism of results. The results were similar to those reported above. In our last sensitivity analysis, we examined an alternative specification for parental education, where the variable was coded as high school education or less (69.76%) versus some college or higher education (31.24%). (This variable was originally coded as less than high school education or more.) For both episodic memory and global cognition, the interaction between race and parental education was not significant.

Discussion

Pooling data from three population health studies in the United States, this study provides evidence that the protective effect of having a parent who completed high school on both global cognition and episodic memory was only applicable to participants identified as White, and not for participants identified as Black. This finding is consistent with the study's hypothesis and the theory of MDR (Assari, 2018b). The theory of MDR posits that the protective effects of higher socioeconomic status are systematically diminished among individuals from historically marginalized racial groups due to racism. This theory emphasizes that not only are individuals racialized as Black at higher risk for lower cSES but also benefit less from higher SES in comparison to their counterparts racialized as White because of societal-wide racism (Akhlaghipour & Assari, 2020). Despite 20th century policy developments to facilitate social mobility among historically marginalized racial groups (e.g., the Civil Rights Act of 1964; Hersch & Shinall, 2015), empirical evidence continues to support MDR in terms of cognition among younger cohorts (Akhlaghipour & Assari, 2020) and older adults (Reynolds et al., 2022).

Although the sensitivity analyses somewhat temper the study results (specifically after the inclusion of stroke and hypertension as covariates), we continue to interpret these findings as being consistent with the theory of MDR (Assari, 2018b). Indeed, stroke, hypertension, and own educational attainment may be potential mediators that need to be further understood in future research. In addition, the alternative specification of our parental education variable suggests that the protective effect of having a parent with at least a high school education is protective against lower cognitive performance in middle and later life. This association could be specific to this age cohort, as the large majority of children aged 14–17 were not enrolled in high school between 1909 and 1910 (Snyder & Dillow, 2007). Future studies in subsequent cohorts of older adults should reevaluate if high school education, in particular, is protective for lower cognitive performance in middle and later life.

In addition to extending empirical evidence on parental education and cognitive performance in later life, this paper also contributes by demonstrating that IPD meta-analysis can be used as an approach to retrospectively pool participants across studies. In addition, we demonstrate that episodic memory, in comparison to global cognition, is more likely to be harmonizable due to lower I^2 percentages after pooling. We therefore interpret the results with global cognition as the outcome with caution due to the relatively high I^2 value and the differences in measurement across individual studies. Although our study yielded statistically significant results for global cognition, other studies using different or similar measures may not yield robust results. Overall, these findings suggest the value of population health studies using more similar measurement protocols to assess discrete cognitive functions for harmonization purposes.

Limitations

The major limitation of this study is that *c*-centering does not allow for the direct examination of measurement invariance across studies to assess the exchangeability of test scores (Griffith et al., 2013). The lack of test score exchangeability

presumably would bias samples due to increased measurement error; this may lead to Type II errors, where associations exist but are not detected. Although IRT and latent variable approaches are methodologically preferred for data harmonization studies, they were not feasible for this study due to the lack of shared assessments of cognition across the population health studies.

Furthermore, in the current study, we cannot assess the extent to which selective mortality, attrition, and selective eligibility for cognitive assessments may have affected our study results. Selection is particularly salient in our study as people identified as Black are more likely to be in poor health and die earlier than their counterparts identified as White (For the Health ABC Study, 2012). This limitation is compounded by the fact that our methodology did not allow us to utilize survey sampling weights to adjust for the complex survey designs of individual studies, which included oversamples of people identified as Black. Therefore, future research is needed to verify our study findings in larger, prospective cohort studies to ensure that our results were not the result of selective attrition bias.

Another major limitation of this study is that measures of other relevant covariates were not available from the three data sets, such as childhood cognitive functioning and rurality of childhood residence. These measures would allow for the statistical control of potential confounders. In addition, this study was limited to only participants racialized as non-Hispanic Black or White. Future studies with sufficient numbers of participants with other racialized identities are important to further extend understanding of how MDR might apply to considerations of life course social inequalities and cognition in middle and later life.

Finally, the measures of global cognition varied vastly across individual study, which could indicate that harmonization was not possible. Although we could not perform statistical harmonization using IRT or other methods to account for measurement differences, our I^2 values for this construct indicated moderate between-study heterogeneity. Future studies should consider prospectively harmonizing cognitive measures or selecting measures with a shared set of items to facilitate statistical harmonization.

Conclusion

Overall, this study provides additional evidence in support of the theory of MDR within gerontological research, with a focus on midlife and later-life cognitive performance. Using pooled data from three large population health studies in the United States, we found that the protective effect of parental completion of high school on global cognition and episodic memory was diminished among adults identified as Black compared to their counterparts identified as White. Such findings indicate the continued importance of considerations of structural and systemic racism within research, policy, and programs oriented to life course risk and protection for brain health and cognition.

Supplementary Material

Supplementary data are available at *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* online.

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Conflict of Interest

None.

Data Availability

This study was not preregistered. All data used in this manuscript are publicly available from administrators of the respective data sets.

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