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Race/Ethnic Differences, Skin Tone, and Memory Among Older Latinos in the United States

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Abstract

Objectives: U.S. Latino populations are diverse. Research on racial identity, skin tone, and Latino health is imperative for understanding and combating racism and colorism. We examined differences in memory performance: among non-Latinos and Latinos who identified as Black, other, and White in the United States and then among Puerto Ricans in Boston whose skin tones ranged from dark, medium, light to "white."
Methods: We used 2010 Health and Retirement Study and 2004 Boston Puerto Rican Health Survey data, respectively, to examine racial and color differences in memory performance among 50 and older adults in the United States and Puerto Rican older adults in Boston. We applied ordinary least squares regression to immediate and delayed word recall test scores and adjusted for education, health conditions, and health behaviors.
Results: In adjusted models, White non-Latinos had better memory performance than White Latinos. Black Latinos, other Latinos, and Black non-Latinos had lower delayed word recall scores than White Latinos. Black Latinos and Black non-Latinos had similar scores. Intra-Latino racial disparities endured despite the inclusion of education and other covariates. Among Puerto Ricans in Boston, medium-toned individuals had higher scores than "white"-toned individuals.
Discussion: Findings support the importance of examining self-identified race and skin tone in Latino aging research. Further investigation is needed to understand the stubborn intra-Latino racial disparities in memory performance and surprising adverse cognitive performance among "white"-toned relative to darker-toned Puerto Ricans in Boston.

Keywords: Cognitive aging, Hispanic aging, Hispanic health, Racial disparities, Skin color

Examining and understanding race and color inequalities in Alzheimer's disease and related dementia (ADRD) among Latino populations is essential for reducing disparities. Recent nationally representative research shows that Latino older adults endure greater hardship, stress, and health risks than non-Latino White older adults, while having similar health risks as non-Latino Black older adults (Boen & Hummer, 2019). Indeed, Latino (and Black) older adults experience earlier and longer spells of cognitive impairment, and inequalities increase for individuals with lower education (Hale, Schneider, Mehta et al., 2020).

Latinos' experiences in the United States are diverse and racialized (Frank et al., 2010; Golash-Boza & Darity, 2008), yet research in racial and color disparities among Latinos is only now budding. Scholars have often conflated Latinos' racial self-identification and skin tone, instead of recognizing these as distinct, overlapping, and sometimes conflicting dimensions of race (Quiros & Dawson, 2013; Roth, 2012). Among Latinos, racial self-identification is not uniformly associated with color and other phenotype differences (Landale & Oropesa, 2002; Roth, 2012). White-identifying Latinos may be dark-toned and Black-identifying Latinos may be light-toned (Frank et al., 2010). As such, it is important to analyze separately racial self-identification and skin tone and how each may relate to cognitive health outcomes.

This study's objective is to examine race- and color-related inequities among Latinos in ADRD by evaluating memory performance. Previous work indicates that low scores on neurocognitive tests in population samples strongly predict future risk of dementia (Elias et al., 2000). We use two complementary data sets to explore racial self-identification and skin tone as different but closely related dimensions of race. First, we leverage the nationally representative U.S. Health and Retirement Survey, to analyze how racial self-identification (Black, White, other) of Latinos in the United States may be associated with memory performance. Second, we turn to color and focus on a single Latino subgroup—Puerto Ricans—to analyze how skin tone is associated with memory performance in the population-based Boston Puerto Rican Health Survey (BPRHS). Puerto Rican older adults are an ideal group to observe, as they are phenotypically diverse and have birthright U.S. citizenship, thus experiencing lower barriers to migration. With our two-pronged approach, we contribute new insight into race and color disparities in memory performance among U.S. Latinos. To our knowledge, our study is the first population-based study to contrast memory performance or any other measure approximating cognitive health of Black Latinos, White Latinos, and Latinos who identify as neither Black nor White. It is also the first to examine color disparities among memory performance or any other measure approximating cognitive health among Latino older adults.

Race, Skin Tone, and Cognitive Health

Race is a social construct that has multiple dimensions (Roth, 2016). Scholars can better understand the salience of race by examining its diverse dimensions, which include racial self-classification and phenotype. Racial self-classification refers to the race category(ies) that respondents check in social surveys and censuses. These choices, often U.S. Census race categories, are limited and represent a particular racial schema or understanding of race. Racial disparities in health research usually rely on racial self-classification measures. Phenotype is another dimension of race that refers to a person's physical features

and is used by others to make racial classifications. Skin color appears to be the primary way that others categorize an individual by race (Feliciano, 2016). In this article, we analyze racial self-classification alongside interviewer-rated skin tone.

Examining race and its multiple dimensions is important for understanding Latino health and well-being (Telles, 2018). Deliberately constructed and institutionalized through the efforts of activists, media leaders, and bureaucrats (Mora, 2014), the pan-ethnic Hispanic/Latino category encompasses a great diversity of origins, racial identities, phenotypes, and socioeconomic statuses (Telles, 2018). The U.S. Census has asked respondents about Hispanic origin since 1970. It also asks separately about race. While many U.S. Latinos consider Hispanic/Latino to be both race and ethnicity (Hitlin et al., 2007), these race and ethnicity questions in census and other data allow researchers to examine how Latino individuals' health may differ by racial self-classification. In the 2010 U.S. Census, 53.0% of self-identifying Latinos identified as White, 36.5% as some other race, and 2.5% as Black or African American (Humes et al., 2011). Some nationally representative studies find that Black Latinos in the United States have poorer health than White Latinos; for example, Black Latinos are more likely to report diabetes (Borrell et al., 2007) and hypertension (Borrell, 2006). Black Latinos also lack the hypertension advantage over non-Hispanic White adults that White Latinos enjoy (Borrell, 2009). To our knowledge, no previous study has examined memory performance or other measures approximating cognitive health of Latino individuals by race.

Color or skin tone has implications for well-being and health. Previous research of African Americans finds that having darker skin tone is associated with lower educational attainment (Loury, 2009; Hersch, 2006), poorer labor market and economic outcomes (Keith & Herring, 1991), higher risks of hypertension (Harburg et al., 1978), but also lower risk for mental health conditions (Louie, 2020), and associations with self-reported health measures are inconsistent (Borrell et al., 2006). Colorism's pernicious effects appear to start in the womb: mother's self-rated skin tone intersects with racial discrimination to shape the use of prenatal care (Slaughter-Acey et al., 2019), while maternal skin tone interacts with mother's birth cohort to mark preterm delivery (Slaughter-Acey et al., 2020).

Research on racial and skin tone disparities in Latino health is limited but growing (Cuevas et al., 2016). Most previous research focuses on socioeconomic outcomes of the majority Latino group, Mexican Americans, and shows that lighter-toned Mexican Americans had higher educational attainment (Murguia & Telles, 1996), higher income (Telles & Murguia, 1988), and higher occupational status (Espino & Franz, 2002). Skin tone research of Latinos of non-Mexican descent in the United States and of Latino health in general is more limited. Occupational prestige is lower for darker-toned Cuban and Mexican individuals,

but not for Puerto Ricans (Espino & Franz, 2002). In terms of health, darker skin tone is also associated with poorer self-reported health of Latinos in the United States (Garcia et al., 2015) and diabetes risk and obesity among Latino young adults (Wassink et al., 2017). Depressive symptoms are more likely for darker-toned U.S.-born Mexican American men, but not for women or Mexican-born men (Codina & Montalvo, 1994). In a study of Puerto Rican women, low birth weight was associated with maternal skin tone in the Eastern seaboard states, but not in New York City or Puerto Rico (Landale & Oropesa, 2005). While there is an exciting and growing body of research on Latino ADRDs (Garcia et al., 2020; González et al., 2019; Stickel et al., 2020), to our knowledge, no existing population-based study has examined skin tone disparities in neurocognitive test performance among U.S. Latinos.

The health outcomes that dominate racial and color disparities in health research heavily overlap with the modifiable risk factors of dementia. Low education, hypertension, hearing impairment, smoking, obesity, depression, physical inactivity, diabetes, and low social contact are the 12 potentially modifiable risk factors for dementia that account for about 40% of worldwide dementia (Livingston et al., 2020). Given this, we could expect that education, chronic diseases, and health behaviors will explain much of the race and color disparities we expect to find in cognitive health and aging.

Overall, we seek to answer three research questions about ethnoracial disparities of Latino and Puerto Rican cognitive health: (a) Does memory performance differ for White Latino, Black Latino, and other Latino older adults in the United States? (b) Are intragroup color differences in memory performance salient for Puerto Rican older adults? (c) Are these race/color differences explained by socioeconomic status, chronic disease, or health behavior patterns? We seek to test the following hypotheses: (a) White Latinos will have better memory performance than other- and Black-identifying Latinos; (b) "white"-toned Puerto Ricans will have memory performance advantages over other Puerto Rican older adults; and (c) race/color differences will diminish as we account for education, family background, and health behaviors.

Data and Methods

We use two sources of data. Data on self-classified race come from the Health and Retirement Study (HRS), a nationally representative sample of U.S. adults aged 50 years and older, interviewed biannually since 1992. The HRS oversamples Black and Latino respondents to facilitate analysis of these groups. We invoke sample weights to approximate national representativeness although we acknowledge the limitation of small cells in some subgroups. Detailed description of the HRS is available elsewhere (Sonnega et al., 2014). We employ the 2010 HRS data given its larger sample size overall ($n = 22,034$) and

of Black Latinos ($n = 77$) than other single-year HRS data. Respondents who had proxy informants (6.3%, $n = 1,382$) or were missing at least one covariate (2.3%, $n = 500$) were excluded from the analytical sample. The most frequent missing covariates were body mass index (BMI; 1.8%, $n = 393$) and self-classified race (0.3%, $n = 75$). Our final HRS analytical sample includes 20,152 older adults. Our 2010 HRS sample of Latino older adults is comparable to Latino older adults in the 2010 American Community Survey (Supplementary Appendix Table 1a). Because our sample includes respondents who have been involved in HRS for different amounts of time, we consider (a) practice effects (changes in test performance due to repeat evaluations) by including test number in all HRS models and (b) survey attrition by cognitive status and self-classified race (Supplementary Appendix Table 1b). While practice effects are statistically and practically significant, their inclusion had little impact on results. We consider survey attrition between 2004 and 2010, which indicates that selective attrition by cognitive status and race is a potential concern ($p < .000$). Notably, individuals of normal cognition at baseline and who identify as non-Latino other, other Latino, and White Latinos appear more likely to be lost to follow-up between 2004 and 2010. As with the large body of similar work using the HRS and related panel surveys, we are not able to quantify any resulting bias, but instead simply note this as a limitation that will require future work to elucidate.

Data on skin tone come from the BPRHS, a longitudinal population-based survey of Puerto Rican adults aged 45–75 years in the Boston metropolitan area. Eligible participants are persons of self-identified Puerto Rican descent and able to answer questions in English or Spanish. Individuals who had a low Mini-Mental State Examination score (≤ 10) were excluded. Detailed description of the BPRHS is available elsewhere (Tucker et al., 2010). We use the 2004 baseline data. For sake of comparison to the HRS, we restrict the sample to adults aged 50 years and older (1,233 of 1,502 respondents). We excluded $n = 9$ adults who were missing data on race or memory test scores, leaving a final analytical cohort of $n = 1,224$.

Measuring Memory Performance

Two cognitive tests overlap in the BPRHS 2004 and HRS 2010 neurocognitive test batteries: immediate and delayed word list recall. Both measure memory. The BPRHS used the Artiola i Fortuny Spanish Verbal Learning Test (Artiola i Fortuny et al., 1998), which was modeled after the California verbal learning test language (Delis et al., 1987). The HRS word list learning task has been described and validated previously (McArdle et al., 2007; Ofstedal et al., 2005). First, both batteries include an "immediate word recall" where the interviewer reads a list of nouns and then asks the respondent to name as many words from the list as possible. The BPRHS included 16 items, and

the HRS 2010 had 10 items. Second, both surveys collect a "delayed word recall." In the HRS, after approximately 5 min on other survey questions (or completing other cognitive tests), the interviewer asks the respondent to recall the word list again. The BPRHS neurocognitive test battery is more complex: The interviewer presents and elicits the original word list five times; then presents and elicits an alternative word list; then asks the respondent to recall the original list twice—without and while facilitated with clues. Twenty minutes later, the interviewer asked the respondent to produce the original list again on their own. For the BPRHS delayed word recall, we selected the first recall that follows the presentation of the alternative word list, as it resembles most of the HRS delayed recall. For comparability purposes, we rescale all scores on a 0–100 scale for presentation of analyses results.

Measuring Race/Color

The HRS asked for respondents' self-classified race and Latino identity. We created a variable combining respondents' primary racial self-identification (White/Caucasian, Black/African American, other) and their Latino identity. The six categories were non-Latino Black, non-Latino other, non-Latino White, Black Latino, other Latino, and White Latino. White Latinos are the reference group. The 2010 HRS was fairly balanced between Mexican ($n = 1,470$) and Latino older adults of other ethnicities ($n = 1,029$); and while racial self-identification was associated with the Latino subgroup (Supplementary Appendix Table 1c), we could not explicitly analyze these due to small cell sizes. Neither could we consider multiracial identities as only 339 2010 HRS respondents reported more than one race.

In the BPRHS, during a series of postinterview observations, interviewers rated each respondent's skin tone from darkest to lightest: dark, medium, light, or white. As white is commonly associated with racial identification, we will use the double-quoted terms "white" or "white-toned" when referring to skin tone that has been rated white. Most individuals were rated as either medium-toned or light-toned. Throughout the article, we employed the "white-toned" individuals as the reference group. Interwave reliability of interviewer-skin tone shows that this measure was imperfect, with a nontrivial fraction of respondents coded in the adjacent categories across waves (Supplementary Appendix Table 1d); we do not have a gold standard measure, but chose to use the measure from the 2004 baseline survey. Neither could we examine key interviewer characteristics (e.g., racial identification, education) as only sex is available and all interviewers identified as female.

Measuring Chronic Disease Covariates

Diabetes—In the HRS, the respondent reported whether a doctor had ever told them they had diabetes. In the BPRHS, the respondent was considered to have diabetes if fasting serum glucose biomarker was more or equal to 126 mg/dL or if the respondent reported taking any diabetes medicine.
Hypertension—In the HRS, the respondent reported whether a doctor ever told them they had high blood pressure. In the BPRHS, respondents' blood pressure was measured three times during the home interview. The respondent was considered to have hypertension if the mean systolic blood pressure was greater or equal to 140 mmHg, if the mean diastolic blood pressure was greater or equal to 90 mmHg, or if the respondent reported taking any hypertension medicine.
Body mass index—In the HRS, the respondent reported their own height and weight. Self-reported BMI (kg/m^2) was calculated from these self-reports. In the BPRHS, respondents' height and weight were measured twice. BMI was computed by dividing the average weight (kg) by the square of the average height (m). BMI has been associated with higher dementia risk in previous research (Qizilbash et al., 2015).

Measuring Other Covariates

Education—We distinguished among four categories: 6th grade or less, 7th–11th grade, 12th grade or equivalent, college or more. We opt for the categorical over a continuous measure of education given the highly nonlinear effects commonly seen for education, in which individuals tend to group at diploma levels or just before school transitions.
Exercise (0/1)—This variable distinguished whether the respondent reported having done moderate or vigorous physical activity. In HRS, the time frame was the past month, while in the BPRHS, the time frame was a typical week.
Tobacco (0/1)—In the HRS, the respondent reported whether they had ever smoked. In the BPRHS, the respondent was considered to have ever smoked if they reported smoking at least 100 cigarettes over their lifetime.
Health insurance (0/1)—The respondent reported whether they had health insurance at the time of the survey.

All models included age, age squared, birthplace (whether the respondent was born outside the United States or in Puerto Rico), and sex. We used age squared to account for cognitive functioning nonlinearities in age (Gao et al., 1998). Full models also contained a dichotomous marital and partnership status. All HRS models incorporated interview language (English, Spanish) and test number (first-time; second to fourth, fifth to seventh, eighth or more) to account for possible practice effects in HRS (Hale, Schneider, Gampe et al., 2020). All BPRHS models incorporated interview language (English, Spanish, both English and Spanish).

Analytic Strategy

For each of the cognitive test outcomes, we ran three ordinary least squares regression models. In Model 1, we aimed to illustrate overall race and color disparities in cognitive

Table 1. Sample Characteristics by Race and Skin Tone

	2010 Health and Retirement Survey								2004 Boston Puerto Rican Health Study					
	Non-Latino Black	Non-Latino other	Non-Latino White	Black Latino	Other Latino	White Latino	Total	$p^{\wedge}$	Dark-toned	Medium-toned	Light-toned	"White"-toned	Total	p
n	3,901	651	13,071	68	982	1,479	20,152		160	472	412	180	1,224	
Immediate word recall, mean (SD)	51.2 (21.8)	53.8 (15.8)	57.2 (14.8)	48.8 (21.7)	50.9 (20.6)	49.9 (19.5)	55.9 (16.3)	.60	27.9 (9.3)	28.5 (10.7)	27.3 (11.3)	26.2 (10.7)	27.7 (10.7)	†
Delayed word recall, mean (SD)	37.3 (26.4)	43.0 (18.4)	47.2 (17.6)	34.0 (22.5)	39.8 (23.5)	41.3 (22.9)	45.5 (19.5)	*	42.8 (17.3)	48.4 (18.7)	46.3 (19.4)	41.4 (17.6)	45.9 (18.8)	***
Female (%)	58	51	54	51	50	57	54	.11	71	68	77	73	72	*
Age (years), mean (SD)	62.7 (13.1)	60.9 (8.6)	65.1 (9.6)	65.0 (12.0)	59.9 (9.9)	63.7 (11.8)	64.5 (10.4)	***	59.7 (6.6)	58.4 (6.3)	59.8 (6.6)	59.7 (6.6)	59.3 (6.5)	**
Island/foreign-born (%)	7	44	4	57	57	56	10	.83	98	98	99	98	98	.83
Education (%)								.63						.25
6th grade or less	4	3	1	26	29	31	4		33	40	42	40	40	
7th–11th grade	20	13	8	17	18	16	10		56	47	44	45	47	
12th grade or equivalent	32	28	34	27	25	28	33		11	14	14	16	14	
College or more	44	56	57	29	29	25	53							
Married or partnered (%)	46	68	68	51	66	65	65	.29	28	31	27	25	29	***
Diabetes (%)	29	27	18	25	30	34	20	.25	34	42	46	48	43	*
Hypertension (%)	69	52	51	79	47	56	53	***	78	73	70	74	73	*
BMI (kg/m²), mean (SD)	30.1 (9.7)	28.2 (6.0)	28.2 (5.3)	28.6 (5.6)	29.6 (7.6)	29.3 (7.0)	28.5 (6.0)	.38	32.0 (6.5)	31.4 (6.3)	32.5 (6.9)	32.0 (6.5)	32.0 (6.6)	†
Ever smoke (%)	61	51	56	61	56	54	57	.60	58	55	50	52	53	.34
Exercise in last month (%) / Exercise in usual week (%)	76	86	83	75	84	79	83	†	80	72	77	68	74	*
Has health insurance (%)	47	58	70	38	44	38	65	.13	94	95	96	94	95	.70
Interview in Spanish (%)	0	0	0	36	41	46	4	.17	88	88	87	93	88	.37

Notes: Sources: 2010 Health and Retirement Survey (HRS) and 2004 Boston Puerto Rican Health Study. BMI = body mass index.

$^{\wedge}p$ value for differences among HRS Latino groups. †$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$.

health, adjusting for foreign/island-born status, sex, and age terms. In Model 2, we highlighted the role of education, which was expected to explain most initial disparities and was added to the baseline model. In Model 3, we included marital status and potentially modifiable factors of dementia related to health conditions, behaviors, and status (hypertension, diabetes, BMI, smoking, exercise, and health insurance status) as these were expected to help explain race and color disparities in cognitive health. As mentioned above, all models also include interview language and—in the case of HRS—test number. We accounted for the complex survey design of the HRS by employing survey weights throughout, and robust standard errors were reported for the HRS analysis.

Results

Descriptive Statistics

In the HRS data, racial disparities were more consistent among non-Latinos than among Latinos (Table 1). For example, Black–White differences in memory performance were larger among non-Latinos than Latinos in the HRS. The Latino groups were comparable to one another in many major covariates: foreign/island-born status, education, marital status. They differed in age: other Latinos were younger (mean 59.9 years) than the average Black Latinos (65.0 years) and White Latinos (63.7 years). These age differences may reflect younger Latinos' greater embrace of their race as Latino and rejection of Black and White racial categories (Mora et al., 2022). The Latino groups were similar in educational attainment, as well as chronic health conditions and behaviors (BMI, diabetes, smoking, health insurance status). However, Black Latinos (79%) were far more likely to report hypertension than other Latinos (47%) or White Latinos (56%). Other Latinos were marginally more likely to report exercise in the last month (84%) than their White Latino (79%) and Black Latino (75%) peers. While White, Black, and other Latinos had similar scores on immediate word recall, their delayed word recall scores ($p < .05$) differed, with Black Latinos scoring significantly lower (34.0) than White Latinos (41.3) or other Latinos (39.8).

In the BPRHS, individuals whose skin tones were rated differently were comparable in education and birthplace. They differed in gender, marital status, and some health and related health behaviors. "White"-toned Puerto Ricans were least likely to be married or partnered; most likely to have diabetes and least likely to exercise. Dark-toned Puerto Ricans were most likely to have hypertension and to report ever having smoked. They were also the most physically active. "White"-toned Puerto Ricans tended to have the lowest memory scores, although differences in immediate word recall scores were only marginally significant. Color differences were more evident ($p < .001$) in delayed word list recall scores: "White"-toned Puerto Ricans had

lower delayed word recall scores than their medium-toned and light-toned peers.

Race and Memory Performance

Figure 1 graphically displays the HRS results, relative to the White Latino reference group—regression results are included in Supplementary Appendix Table 2. Racial disparities were more evident for delayed word recall than immediate word recall scores. While the inclusion of education (and to a much lesser extent chronic health conditions and health behaviors) attenuated differences between the non-Latino groups and White Latinos, education did not appear to attenuate the racial differences among Latinos.

Non-Latino White individuals had higher immediate word recall scores than White Latinos. The initial advantage persisted but was reduced by a third once models were adjusted for education. The advantage of non-Latino White individuals (4.56 percentage points more than White Latinos in education-adjusted models) was about four fifths of the size of the advantage that high school graduates have over those with less education. The immediate word recall scores of Black Latinos and other Latinos were not statistically different from White Latinos.
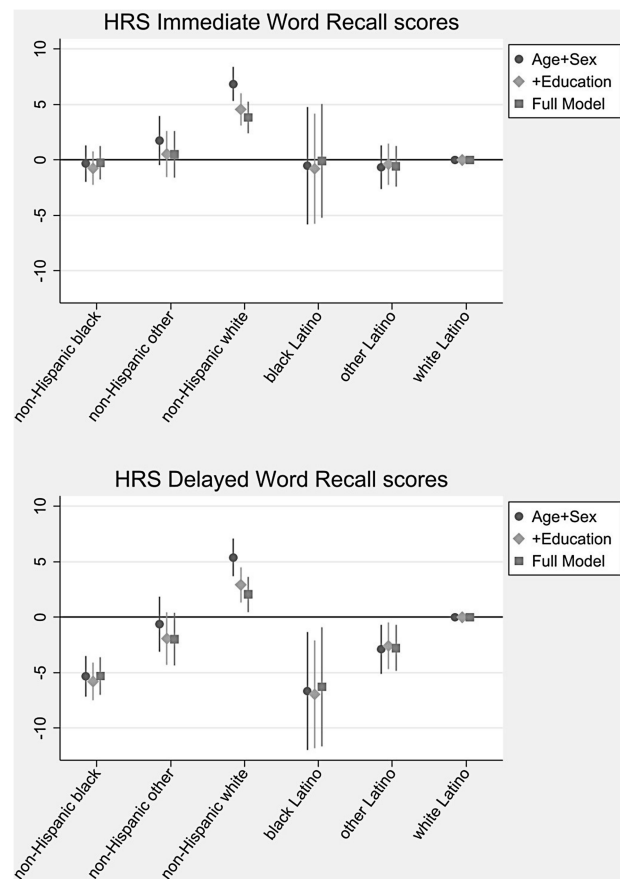

Figure 1. Memory performance by racial self-identification with 95% CI, 2010 HRS. HRS = Health and Retirement Study.

Differences among groups were more salient in the delayed word recall scores. Once again, non-Latino White individuals scored highest, although their advantage was severely attenuated with adjustment for education. The advantage of non-Latino White individuals (2.91 percentage points) was about half the advantage that high school graduates had over those with a incomplete high school education, middle school education, or less. White Latinos scored higher than either Black Latinos or other Latinos, and these disparities persisted with the inclusion of education and additional covariates. The disadvantage of Black Latinos (6.95 percentage points less than White Latinos after adjusting for education) was similar in size and direction as that of non-Latino Blacks (5.79 percentage points in education-adjusted models), slightly larger than the advantage that individuals with a high school degree had over those who did not complete high school, and more than half the advantage of the college-educated over the least educated.

Intra-Latino disparities persisted even as we adjusted for education, marital status, chronic disease (diabetes, hypertension), health indicators, and behaviors (BMI, ever smoke, exercise, insured). The same was true for differences among people of color. However, non-Latino White and White Latino disparities in cognitive scores decreased significantly with the inclusion of education.
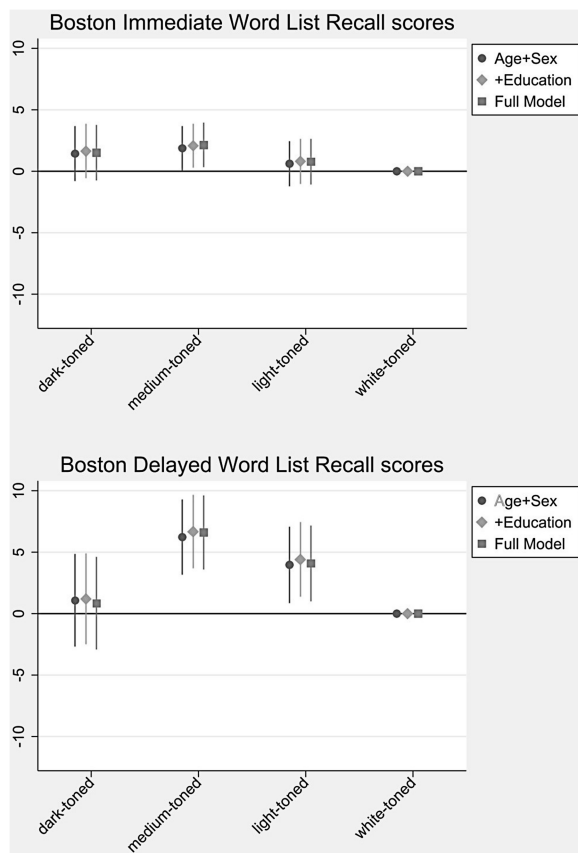

Figure 2. Memory performance by interviewer-rated skin tone with 95% CI, 2004 Boston Puerto Rican Health Survey.

Skin Tone and Memory Performance

Figure 2 graphically displays the BPRHS results, relative to the white-toned reference group, while full regression results are included in Supplementary Appendix Table 3. Color differences were more evident for delayed than immediate word recall scores. Dark-toned Puerto Ricans' results were not statistically distinguishable from those of "white"-toned Puerto Ricans. Surprisingly, "white"-toned Puerto Ricans appeared to be at a disadvantage in memory performance. They performed worse than medium-toned Puerto Ricans on both outcomes and had lower delayed word list recall scores than light-toned Puerto Ricans. Neither education, chronic health conditions, nor health behaviors attenuated these color-related differences.

In the BPRHS, medium-toned Puerto Ricans had higher immediate recall scores than "white"-toned Puerto Ricans. The advantage of the medium-toned Puerto Ricans (2.23 percentage points less than the "white"-toned in education-adjusted models) was two fifths the size of the advantage that individuals with a college education had over those with only primary schooling or less, and more than the advantage that high school graduates had over the least educated. Dark-toned Puerto Ricans also appeared to have an advantage over "white"-toned Puerto Ricans, but these differences were not statistically significant. Surprisingly, the advantage of medium-toned Puerto Ricans endured even with the inclusion of education, chronic health conditions, and health behaviors.

"White"-toned Puerto Ricans had lower delayed recall scores than either medium- or light-toned Puerto Ricans. Medium-toned individuals scored 6.49 percentage points higher than "white"-toned Puerto Ricans, while light-toned Puerto Ricans scored 4.49 percentage points higher than light-toned Puerto Ricans. The advantage of the medium-toned Puerto Ricans was statistically and substantively significant (6.84 percentage points more than the "white"-toned in education-adjusted models), about half the benefit that college-educated Puerto Ricans had over individuals with a primary school education. The advantage of the light-toned Puerto Ricans in delayed recall scores (4.74 percentage points more than the "white"-toned Puerto Ricans in education-adjusted models) was about the same as the advantage of high school-educated Puerto Ricans had over those with a primary school education or less. Indeed, these differences unexpectedly endured with the inclusion of education. Dark-toned Puerto Ricans had comparable delayed recall scores to "white"-toned Puerto Ricans. Individuals with in-between skin tones (the light-toned and medium-toned) appeared to score better than either their darkest or lightest counterparts.

Discussion

The results for our national probability sample of Black Latino, White Latino, and other Latino older adults are in line with our expectations. Although dominant racial

categories may awkwardly fit the social realities of Latinos, self-identified race appears to be an important stratifying factor of cognitive health among both Latinos and non-Latinos in the U.S. Black Latinos, and non-Latino Black individuals had lower memory performance than White Latinos. These results support the contention that racial regimes in the United States affect the population health of Latino and non-Latino older adults in the United States and individuals who identify as White may enjoy cognitive health advantage beyond socioeconomic standing and health behavior. While non-Latino Whites had the greatest cognitive health advantage among all groups and performed better than their White Latino peers, a significant part of their advantage over White Latinos was related to higher education and thus largely diminished with the inclusion of education and covariates in the models. In contrast, intra-Latino racial disparities endured despite the inclusion of education and other covariates, as did the disparities between White Latinos and non-Latino Black and non-Latino other individuals. These disparities may result from differential experiences of discrimination (Williams & Mohammed, 2009), psychological stress and weathering (Geronimus, 1992), depression (Williams et al., 2007), and social contact, which may require further research.

On the other hand, our findings that "white"-toned Puerto Rican older adults had poorer cognitive test results than darker-toned Puerto Rican older adults are surprising. There are several possible explanations. First, it is possible that "white"-toned Puerto Rican older adults are structurally disadvantaged compared to other Puerto Rican older adults in the Boston area. However, we would expect then that education attainment of "white"-toned Puerto Rican older adults differ, but instead find their characteristics were comparable to those of their medium- and light-toned peers, and our results remain robust after their inclusion. The results (Supplementary Appendix Table 4) also endure further sensitivity analyses that control for additional characteristics (childhood in the countryside, number of living siblings, ever worked outside home). Second, despite their interviewer-rated skin tone in BPRHS, "white"-toned Puerto Ricans may be socially assigned by the broader community as non-White and then not receive the benefits of White privilege. Previous research (Vargas, 2015) indicated that social status is key: among light-toned Latinos, low-socioeconomic status individuals were unlikely to be perceived as White, whereas high-socioeconomic status individuals were very likely to be perceived as White. Like the other Puerto Rican older adults in the BPRHS, white-toned Puerto Ricans have lower levels of educational attainment—and thus social standing—than the average older adult in the United States and may then be less likely to be perceived as White. However, this explanation would predict *similar* results between "white"-toned and darker-toned Puerto Ricans and cannot explain the *worse* performance among "white"-toned Puerto Ricans relative to light- and medium-toned Puerto Ricans. Third, "white"-toned Puerto Ricans may experience color-based, intragroup social exclusion that negatively affects their mental and cognitive health. Indeed, previous research primarily focused on African Americans has documented ethnic exclusion of light-skinned individuals who "may be excluded from, or made to feel unwelcome in, community events and organizations" and the greater "ethnic legitimacy" of darker-toned individuals (Hunter, 2007). Such exclusion could harm mental health and cognitive aging. The costs of exclusion are likely greater for immigrants who are more dependent on coethnic communities for socialization than the U.S.-born, and residents of poorer communities, like the Puerto Rican communities of Boston and the U.S. Northeast, which have been historically poorer than communities elsewhere in the United States (Santiago & Galster, 1995).

All in all, we provide new evidence of the racialization of cognitive aging in Latino populations. Our findings reflect the reality of race as a social construction. Many Latinos identify primarily as Hispanic/Latino in terms of race and ethnicity, and their racial self-identification in the HRS (which lacks a Hispanic/Latino category in its race question) may be best considered a second-order identity (Telles, 2018). Previous research on classification change has found that Latino identity is very stable, while second-order racial classification—which we rely on in this study—changes and churns (Liebler et al., 2017). Changes are much more common among Black-identifying Latinos than White-identifying Latinos (Liebler et al., 2017). Given this high level of heterogeneity in the Black Latino category, the racial disparities we do find appear starker. Our results of color and cognitive performance rely on interviewer ratings of skin tone, which are themselves key social constructs, and in the case of BPRHS, liable to interwave reliability issues (Supplementary Appendix Table 1d). Previous survey research of non-Latino respondents found that while White interviewers tended to darken Black respondents' skin tone relative to Black interviewers, Black interviewers lightened White respondents' skin tone (Hill, 2002). Same-race interviewers perceived much greater skin tone variation than did other-race interviewers (Hill, 2002). While we do not yet know how interviewer characteristics influence skin color classification for Latino respondents, future research ought to investigate this. While skin tone is a key phenotype used to racially classify others, how a person is socially classified into racial categories depends on a range of factors, and other phenotypic features (e.g., hair texture) also appear to be important, but are rarely measured in large-scale surveys. Future population-based surveys ought to consider collecting information about important dimensions of race and racialization: racial self-identification, interviewer-rated skin tone, socially assigned race, experiences of discrimination, as well as interviewer characteristics (e.g., racial self-identification).

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 declared.

Author Contributions

M.-M. Liu planned the study, performed all statistical analyses, and wrote the article. E. Telles, K. L. Tucker, L. M. Falcon, and I. Z. Jiménez Velázquez contributed to revising the manuscript. W. Dow helped plan the study and revise the manuscript.

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