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# Prevalence of Instrumental Activities of Daily Living Difficulties and Associated Cognitive Predictors Across Racial/Ethnic Groups: Findings From the KHANDLE Study

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## Abstract

**Objective:** Cognitive functioning is associated with instrumental activity of daily living (IADL) performance among older adults. The present study examines potential differences in the prevalence of IADL difficulty and association with cognition across diverse groups.

**Method:** Participants included 455 non-Hispanic Whites, 395 Blacks, 370 Asians, and 296 Latinos aged 65 years and older without a current dementia diagnosis from the Kaiser Healthy Aging and Diverse Life Experience cohort. Participants' self-reported IADL functioning and cognition was measured across episodic memory and executive functioning.

**Results:** Older age, male gender, and being Black were associated with more IADL difficulties. Executive functioning showed a stronger association with IADLs than memory, and it was independent of health status, whereas memory was not. In joint models including both cognitive domains, executive functioning remained a significant predictor of IADL difficulty, but memory did not. Results for both cognitive domains were attenuated with self-rated health added to the joint model. These relationships did not significantly differ across racial/ethnic groups

**Conclusions:** Our study supports previous work suggesting that Black older adults are at increased risk for IADL disability. This is the first study we are aware of that examined the association between specific cognitive domains and IADL performance across multiple racial/ethnic groups. Findings indicate that cognitive functioning has similar associations with self-reported IADL disability across diverse groups, and that executive functioning plays a particularly important role in IADL disability among older adults without dementia; however, health status largely attenuates the relationship between IADL difficulty and cognition.

**Keywords:** Executive function, Functional abilities, Memory

Currently, about 40% of older adults over the age of 65 in the United States have some type of disability ([Centers for Disease Control and Prevention, 2018](#)). Disability is often referred to as loss of ability or difficulties with completing

everyday tasks including instrumental activities of daily living (IADLs) such as financial management, meal preparation, medication management, and household chores. Inability to complete these daily tasks can result in loss of

independence, often prompting considerable lifestyle modifications including the need for caregiver support or transition to an assisted living environment, both of which can lead to major reductions in quality of life (Andersen et al., 2004; Gündoğdu et al., 2019) as well as economic hardship (Castro et al., 2010; Fried et al., 2001; Guralnik et al., 2002; van Lier et al., 2019).

Importantly, there is evidence of racial disparities in rates of IADL difficulties, with a higher prevalence of functional limitations in certain minority groups compared to non-Hispanic Whites (NHWs; Mendes de Leon et al., 2005). Specifically, many previous large-scale epidemiological studies indicate Black older adults have significantly higher levels of disability and a steeper trajectory of functional decline compared to NHWs (Kelley-Moore & Ferraro, 2004). Data from the National Health Interview Survey suggest that Black adults are 1.5 times more likely to have a severe disability (defined as either inability to complete IADLs or “a lot of difficulty”) compared to NHWs (Goyat et al., 2016). There are mixed findings on the prevalence rate of disability among Latinos, with some studies reporting greater degree of disability and need for assistance with everyday tasks in Latinos compared to NHWs (Carrasquillo et al., 2000; Rudkin et al., 1997; Shetterly et al., 1998), while other studies have shown similar rates of disability among these two groups (Goyat et al., 2016). There are also mixed findings from studies looking at disability among Asians, with some studies showing that Asians tended to report more difficulties with IADLs than NHWs later in life (after the age of 70; Ciol et al., 2008), while other studies indicate lower rates of disability in Asians (Fuller-Thomson et al., 2011). The factors driving the differences in IADL functioning across racial/ethnic groups are not entirely clear, but some studies suggest that sociodemographic characteristics, such as lower socioeconomic status (Goyat et al., 2016; Mendes de Leon et al., 2005), and health inequalities, including higher rates of chronic conditions and less access to health care (Andresen & Brownson, 2000; Goyat et al., 2016; Kelley-Moore & Ferraro, 2004; Whitson et al., 2011), may at least partially explain some of these IADL differences.

Declines in IADL functioning among older adults are often a product of multiple factors. Cognitive impairments, even when subtle and below the threshold for meeting criteria for a clinical diagnosis, are known determinants of functional IADL difficulties (Cahn-Weiner et al., 2007). In fact, subtle declines in functional abilities can be a very early indicator of a neurodegenerative disorder such as preclinical Alzheimer’s disease and can even predate objective cognitive impairment (Farias et al., 2006, 2008). Previous work has shown that cognition is an important correlate of IADL functioning. Episodic memory and executive functioning are the two cognitive domains most consistently and strongly linked with IADL performance (Cahn-Weiner et al., 2007; Farias et al., 2013; Johnson et al., 2007), although the relative or independent contribution of each

may vary depending on the health conditions present. Poor general self-rated health has also been associated with worse functional disability (Fong & Kok, 2020; Idler & Kasl, 1995; Lee & Shinkai, 2003), although it is not clear to what degree cognitive functioning is associated with IADLs after accounting for current health status (Garrett et al., 2013).

Examination of the association between cognition and IADL function has mostly been done in NHW samples with very few studies utilizing more diverse samples. One exception is a previous study that examined the association between cognition and IADLs in a population-based Latino cohort wherein both memory and executive functioning were independent predictors of IADLs (Stickel et al., 2020). Executive functioning has also been associated with IADLs in Black community-dwelling older adults (Garrett et al., 2013); however, associations with memory were not examined. Among Chinese older adults without dementia, poorer memory was associated with reduced functional abilities (Tam et al., 2008). In a Korean older adult sample, when memory impairment and executive dysfunction were both present, risk of conversion to dementia with loss of functional abilities was much higher compared to presence of memory impairment alone (Jung et al., 2020). However, these findings may not be generalizable to Asian groups residing in the United States as they were based on non-U.S. samples. Given the higher risk for some medical conditions among many minority populations (Carnethon et al., 2017; Enas et al., 2007; Shaw et al., 2018), particularly those that increase risk for cerebrovascular disease (e.g., hypertension, diabetes, hyperlipidemia, obesity), there may be relative differences in the cognitive predictors of IADLs across ethnic/racial groups. For example, previous studies have shown that cerebrovascular disease is particularly associated with executive impairments (Kramer et al., 2002) and so it is possible in populations that have higher rates of cerebrovascular disease that executive function may play a stronger role in IADL difficulties.

The first aim of this study was to examine baseline level of IADL function in a diverse cohort of older adults representing four racial/ethnic groups including: Blacks, Latinos, Asians, and NHWs. Individuals in this cohort did not carry a diagnosis of dementia or cognitive impairment in their medical records at the time of study enrollment, although a small percent were expected to have undiagnosed dementia or milder forms of cognitive impairment (a diagnosis of mild cognitive impairment was not exclusionary). We sought to determine whether any group(s) showed evidence of disparities in IADL disability. Based on previous work, we hypothesized that NHWs and Asians would have the fewest IADL difficulties, whereas Blacks would have the highest rate of IADL difficulties. We also hypothesized that Latinos would have a higher rate of IADL difficulties compared to NHWs as our sample of Latinos was predominantly of Mexican origin, and previous studies have found greater rates of disability among Mexican-Americans

(Markides et al., 2007). The second aim of the study was to examine the association between cognition (focusing on episodic memory and executive functioning), demographic factors, and self-rated health with IADLs. Given the known health disparities among many minorities that could account for IADL difficulties, we were specifically interested in whether cognitive function was a predictor of IADLs independent of self-rated health and if the relationship between cognitive domains and IADLs differed by racial/ethnic group. We hypothesized that executive functioning would be more strongly associated with IADLs in the three minority groups, given the elevated rates of cerebrovascular risk factors among these groups and the association between executive functioning and cerebrovascular disease.

## Method

### Study Sample

We used baseline data from the Kaiser Healthy Aging and Diverse Life Experiences (KHANDLE) cohort, comprising older adults residing in the San Francisco Bay and Sacramento areas of Northern California. KHANDLE aims to evaluate how ethnicity/race and life course health and sociocultural factors influence late-life brain health and cognition. Individuals eligible for KHANDLE were long-term members of Kaiser Permanente Northern California, an integrated health care delivery system, over the age of 65 as of January 1, 2016, who previously participated in the Kaiser Permanente Multiphasic Health Checkups (MHCs) completed in 1964–1973 or 1977–1985 (although remote data collected from the MHCs were not used in the current study), and did not have a current diagnosis of dementia based on current medical records. Demographics such as age are also based on present-day data. Race/ethnicity was also self-reported at KHANDLE enrollment interviews, in which participants selected any of 24 ethnicities in addition to an open field write-in category. Responses for both measures were categorized into the four primary racial/ethnic groups of Asian, non-Latino Black, Latino, or NHW. For those reporting belonging to multiple of the primary racial/ethnic groups, an indicator reflecting reporting two or more racial/ethnic groups was also included in all models to account for the experiences of multiracial individuals as being distinct from those reporting a single race/ethnicity. Exclusion criteria included electronic medical record diagnosis of dementia or other neurodegenerative disease (e.g., Parkinson's disease with dementia, Huntington's disease), and presence of health conditions that would impede participation in study interviews, defined by hospice activity in the past 12 months, history of severe chronic obstructive pulmonary disease in the past 6 months, congestive heart failure hospitalizations in the past 6 months, and history of end-stage renal disease or dialysis in the past 12 months. A total of 1,712 individuals were enrolled at baseline with efforts to recruit approximately equal proportions of Asian,

Black, Latino, and NHW participants. The KHANDLE study was approved by the Institutional Review Boards at Kaiser Permanente Division of Research and University of California, Davis. Of the 1,712 KHANDLE participants, participants were excluded if missing cognitive outcomes ( $n = 13$ ), self-rated health ( $n = 38$ ), gender ( $n = 0$ ), age ( $n = 0$ ), education ( $n = 5$ ), basic activities of daily living/IADLs ( $n = 136$ ), or if missing/refused race or Native American ( $n = 4$ ). The present analysis included 1,516 individuals.

### Instrumental Activities of Daily Living

Participants self-reported ability to perform three IADL tasks: (a) managing money (such as keeping track of expenses or paying bills), (b) completing chores around the house (like vacuuming, sweeping, dusting, or straightening up), and (c) preparing meals. Difficulty performing each task was rated on a 4-point scale as “1. No Difficulty,” “2. Some Difficulty,” “3. Much Difficulty,” or “4. Unable to do.” Participants who selected an additional option, “5. Do not do this activity,” were excluded. Each of the three IADL tasks was condensed into a binary outcome representing whether participants reported “any difficulty,” whether some, much, or unable to do, and the final composite IADL outcome measured the number of items (of the possible three) that participants reported any difficulty completing.

### Cognition

The Spanish and English Neuropsychological Assessment Scales (SENAS) has undergone extensive development as a battery of cognitive tests relevant to diseases of aging (38–41). Modern psychometric methods based on item response theory (IRT) were used to create psychometrically matched measures across different domains (episodic memory and executive functioning) and across English and Spanish versions. Language of test administration was determined by an algorithm that combined information regarding each participant's language preference and language usage in several specific contexts (e.g., conversing at home, listening to radio or television, conversing outside the home, preferred language for reading). This study used a subset of SENAS tests to measure two cognitive domains: episodic memory and executive function as these two domains have been most consistently associated with IADL function in previous studies (Farias et al., 2008). Verbal episodic memory composite scores were derived from a multitrial 15-item word list–learning test. The word list is read out loud to the participant over five learning trials; specific indices of learning included number of words recalled across each of these five trials. A free delayed recall trial following a distractor task is also administered. The composite incorporates all five scores. The episodic memory score is an IRT score based on the five learning trials and delayed recall scores. For executive function, IRT scores were calculated for category fluency (animals, fruits,

vegetables), phonemic (letter) fluency (F and L), and working memory (digit-span backward, visual-span backward, list sorting). These IRT scores were averaged to create a single executive function composite. Previous publications have validated the episodic memory and executive function composites used in this study; specifically, the episodic memory score represents a dimension of cognition that is separable from working memory, fluency, and other cognitive domains (Mungas et al., 2011) and combining fluency and working memory scores yields an empirically justified executive function composite (Crane et al., 2008). The executive function composite score was obtained using component tasks of category fluency, phonemic (letter) fluency, and working memory (digit-span backward, visual-span backward, list sorting). Each domain was  $z$ -standardized using the full baseline sample mean and standard deviation (mean of 0 and  $SD$  of 1, range =  $-4$  to  $4$ ).

### Self-Rated Health

Participant self-reported health was rated on a 5-point scale as “1. Excellent,” “2. Very good,” “3. Good,” “4. Fair,” and “5. Poor.”

### Data Analysis

Distributions of all variables were examined overall as well as separately for each racial/ethnic group based on a priori hypotheses (Asian, Black, Latino, NHW). The relationships between cognition and IADL difficulty were estimated using separate multivariable ordinal logistic regression models for each cognitive domain (verbal episodic memory and executive functioning) as a predictor of the number of IADL items participants reported difficulty completing—for models in which the proportional odds assumption was not rejected (score test  $p$  value  $> .05$ ), a single odds ratio (OR) from a proportional odds model representing the odds of reporting any difficulty on an additional IADL item was calculated. If the proportional odds assumption was rejected (score test  $p$  value  $\leq .05$ ), parameter-specific ORs for each increasing level of number of IADL items from a nonproportional odds model were calculated. Models sequentially controlled for (a) demographic variables: age at interview, race/ethnicity, mixed race status, gender, and years of education, and (b) self-rated health. Sensitivity analyses assessed the independent effects of verbal episodic memory and executive functioning in the same model as well as potential effect modification of the relationship between SENAS scores and IADLs separately for race/ethnicity and gender. All analyses were conducted in SAS 9.4 (SAS Institute, Cary, NC).

## Results

### Participant Characteristics

Table 1 presents demographic information for each of the four racial/ethnic groups. The average age of KHANDLE

participants was  $75.8 \pm 6.9$  years and the sample was primarily female (59.6%), which differed across racial/ethnic groups. Asian and NHW participants reported higher levels of education compared to Black and Latino participants. In this sample, a total of 1,492 participants (98.42%) completed the testing in English and 24 (1.58%) completed it in Spanish.

Neuropsychological measures of verbal episodic memory and executive functioning varied significantly across racial/ethnic groups, with Asian participants obtaining the highest verbal episodic memory scores and NHW participants obtaining the highest executive functioning scores.

Overall, the rate of IADL difficulty in our cohort (30%) was relatively low as our study found that the majority of participants across all racial/ethnic groups reported difficulty on no IADL items. Given the exclusion of individuals with a current diagnosis of dementia in their recent medical records, this finding was expected. Pairwise comparison for any IADL difficulty versus no IADL difficulty by race showed that Blacks had significantly greater IADL difficulty when compared to the Latino ( $p < .01$ ), NHW ( $p < .01$ ), and Asian ( $p < .01$ ) groups. Table 2 shows that Black participants had 61% higher odds of reporting difficulty on an additional IADL compared to NHW participants (OR: 1.61; 95% CI: 1.20, 2.15). Odds of reporting difficulty on an additional IADL were similar for Asian and Latino participants compared to NHW participants. Table 2 shows that when education was included as a mediator, we found a similar pattern of results as Black participants still had a higher odds of reporting difficulty on an additional IADL, suggesting that education does not confound the relationship. Additionally, Black participants were the most likely to report difficulty on at least one item (Black: 37%, NHW: 29%; Asian 27%, Latino: 27%). Furthermore, 12.7% of Blacks reported difficulty on two items (Asian: 6.2%, Latino 6.8%, NHW: 5.9%), and 2.8% of Blacks reported difficulty on all three items (Asian: 1.1%, Latino 0.7%, NHW: 0.9%).

### Demographic, Cognitive, and Self-Rated Health Predictors of IADLs

Because verbal episodic memory and executive functioning are fairly highly correlated, we ran separate models for the cognitive variables: episodic memory and executive functioning. Table 3 shows the results of the models including verbal episodic memory. In Model 1, we found that older age, male gender, and being Black were associated with worse IADL function. Worse memory performance was also associated with worse IADL functioning independent of other variables. In covariate-adjusted regression analyses examining the association between verbal episodic memory and IADL difficulty, each standard deviation unit decrease in verbal episodic memory score (worse performance) was associated with a 15% increased odds of reporting difficulty on an additional IADL item in Model 1 (OR: 0.85;

**Table 1.** Descriptive Characteristics of KHANDLE Participants at Baseline

	Race/ethnicity										<i>p</i> Value*
	Overall <i>N</i> = 1,516		Asian <i>n</i> = 370		Black <i>n</i> = 395		Latino <i>n</i> = 296		White <i>n</i> = 455		
	<i>N</i> /mean	%/ <i>SD</i>	<i>N</i> /mean	%/ <i>SD</i>	<i>N</i> /mean	%/ <i>SD</i>	<i>N</i> /mean	%/ <i>SD</i>	<i>N</i> /mean	%/ <i>SD</i>	
Age at interview	75.8	6.9	75.5	6.8	75.0	6.7	75.9	6.7	76.6	7.2	.0057
Gender											.0008
Female	885	59.6%	197	54.4%	263	68.1%	166	57.4%	259	57.8%	
Male	600	40.4%	165	45.6%	123	31.9%	123	42.6%	189	42.2%	
Mixed race	88	5.8%	10	2.7%	15	3.8%	63	21.3%	0	0.00%	<.0001
Self-rated health	2.7	0.9	2.6	0.9	3.0	0.9	2.7	0.9	2.5	0.9	<.0001
Years of education	14.7	3.0	15.6	2.6	14.3	2.7	13.4	3.8	15.3	2.8	<.0001
Verbal episodic memory	0.0	1.0	0.2	1.0	-0.1	0.9	-0.1	0.9	0.1	1.0	<.0001
Executive functioning	0.1	1.0	-0.2	0.8	-0.2	0.8	-0.2	0.9	0.6	1.1	<.0001
IADL difficulty											.0011
Difficulty on 0 items	1,061	70.0%	270	73.0%	249	63.0%	217	73.3%	325	71.4%	
Difficulty on 1 item	314	20.7%	73	19.7%	85	21.5%	57	19.3%	99	21.8%	
Difficulty on 2 items	120	7.9%	23	6.2%	50	12.7%	20	6.8%	27	5.9%	
Difficulty on 3 items	21	1.4%	4	1.1%	11	2.8%	2	0.7%	4	0.9%	

Notes: IADL = instrumental activities of daily living; KHANDLE = Kaiser Healthy Aging and Diverse Life Experiences. Data are raw scores unless otherwise indicated. Episodic memory and executive function are in *z* scores (mean 0, *SD* 1).

\**p* Value represents differences across racial/ethnic groups (*t* test for continuous values, and chi-squared for categorical variables).

95% CI: 0.74, 0.97). However, the impact of verbal episodic memory on IADL function was attenuated in Model 2 after the inclusion of self-rated health. No evidence for effect modification was found for the relationship between verbal episodic memory and IADL difficulty by race/ethnicity (*p* = .21) or gender (*p* = .92), suggesting that the relationship between episodic memory and IADLs was similar across racial/ethnic and gender groups.

Next, we examined predictors of IADLs that included executive functioning (Table 4). Similar to previous models, older age and male gender were associated with worse IADL function. Across models, Latino race/ethnicity consistently showed more difficulty on IADLs though not a statistically significant difference. Executive function was also associated with IADL performance such that each standard deviation unit increase in executive functioning was associated with a 26% lower odds of reporting difficulty on an additional IADL item (OR: 0.74; 95% CI: 0.64, 0.86). This effect remained after further adjustment for self-rated health in Model 2, though the effect was slightly attenuated (OR: 0.84; 95% CI: 0.73, 0.98). Again, no effect modification for the relationship between executive functioning and IADL difficulty was found by race/ethnicity (*p* = .81) or gender (*p* = .61).

Table 5 shows the independent effects of verbal episodic memory and executive functioning in the same model. In Model 1, executive functioning remained a significant predictor of IADL difficulty with each standard deviation unit increase in executive functioning associated with a 24% lower odds of reporting difficulty on an additional IADL item (OR: 0.76; 95% CI: 0.65, 0.89). The association between verbal episodic memory and IADL difficulty was attenuated with the inclusion of executive functioning (OR: 0.93; 95% CI: 0.81, 1.08). Results were further attenuated in Model 2 after additional adjustment for self-rated health

(verbal episodic memory OR: 0.96, 95% CI: 0.82, 1.11; executive functioning OR: 0.86, 95% CI: 0.73, 1.01).

## Discussion

While there have been mixed findings on the prevalence of disability among some minority groups (including Latinos and Asians), there have been fairly consistent findings that Blacks have higher rates of IADL difficulty (Goyat et al., 2016; Kelley-Moore & Ferraro, 2004). Similarly, the present study found that in unadjusted comparisons, Black older adults had higher rates of IADL difficulty than the other three racial/ethnic groups (Latinos, Asians, and NHWs). Furthermore, our findings suggest that the difference in the prevalence of disability between Blacks and the other groups widened as degree of IADL difficulty increased. For example, the prevalence of difficulty with two IADLs among Blacks was about double that of the other groups and the prevalence of difficulty with three IADLs was two to three times higher among Blacks. Such findings are also consistent with other studies showing more severe disability in Blacks (Carrasquillo et al., 2000; Goyat et al., 2016; Ostchega et al., 2000; Whitson et al., 2011). In contrast, we did not find an elevated rate of disability among our Asian group, and while some analyses indicated a trend for higher rates of IADL disability among Latinos, this was not a strong or consistent finding. Previous work suggests there may be regional and subgroup differences among Latinos and Asians explaining inconsistent findings on the prevalence rate of disability among these groups (Fuller-Thomson et al., 2011; Markides et al., 2007; Mutchler et al., 2007). Specifically, Puerto Rican, Mexican American, and Dominican Latinos have been shown to have greater disability compared to NHW, while Central Americans and Cubans have similar or lower rates of disability compared to NHW (i.e., South Americans; Markides et al., 2007). While some

**Table 2.** Odds of Reporting Difficulty on Additional IADLs for Each Racial/Ethnic Group Compared to NHW Participants

	Model 1				Model 2			
	OR	95% CI		<i>p</i> Value	OR	95% CI		<i>p</i> Value
		Lower	Upper			Lower	Upper	
Asian	0.99	0.73	1.35	.9672	1.00	0.73	1.36	.9889
Black	1.61	1.20	2.15	.0014	1.56	1.16	2.09	.0029
Latino	0.88	0.62	1.25	.4835	0.83	0.58	1.19	.3106
NHW	Ref.				Ref.			

Notes: CI = confidence interval; IADL = instrumental activities of daily living; NHW = non-Hispanic White; OR = odds ratio. Model 1 adjusted for age, gender, and mixed race. Model 2 adjusted for age, gender, education, and mixed race.

**Table 3.** Association Between Verbal Episodic Memory and IADL Difficulty

	Model 1				Model 2			
	OR	95% CI		<i>p</i> Value	OR	95% CI		<i>p</i> Value
		Lower	Upper			Lower	Upper	
Verbal episodic memory	0.85	0.74	0.97	.0139	0.91	0.79	1.04	.1533
Proportional odds assumption				.3556				.5984
Covariates								
Age	1.03	1.02	1.05	.0002	1.03	1.01	1.05	.0015
Male gender	0.49	0.38	0.63	<.0001	0.48	0.37	0.62	<.0001
Race/ethnicity								
Asian	0.99	0.73	1.36	.9661	0.89	0.65	1.23	.4736
Black	1.48	1.10	1.99	.0091	1.16	0.85	1.58	.3405
Latino	0.80	0.56	1.15	.2361	0.75	0.52	1.09	.1316
Mixed race	1.47	0.90	2.39	.1259	1.36	0.83	2.25	.2256
Years of education	0.98	0.95	1.02	.4237	1.02	0.98	1.06	.2999
Self-rated health					2.13	1.86	2.45	<.0001

Notes: CI = confidence interval; IADL = instrumental activities of daily living; OR = odds ratio. Model 1 adjusted for race/ethnicity, mixed race status, baseline age, gender, and years of education. Model 2 additionally adjusted for self-rated health at baseline. Score test was used to determine whether models upheld the proportional odds assumption; assumption is met if  $p > .05$ .

studies have shown that Asian groups tend to have lower rates of disability compared to NHWs, there is variability in disability prevalence among Asian subgroups, including greater disability among certain subgroups such as Hawaiian/Pacific Islanders and Vietnamese, who made up a very small number in KHANDLE (Fuller-Thomson et al., 2011). Unfortunately, we were unable to examine if there were differences in IADLs within specific subsets of the minority groups (e.g., such as country of origin/descent) as those data were not available; this will be important in future studies.

While it is important to identify groups that may suffer from disproportionately higher rates of functional disability, understanding the factors that contribute to disability and possibly to disparities in disability is paramount. In a model that included demographic factors and episodic memory performance, we found that worse verbal episodic memory along with older age, male gender, and Black race/ethnicity were all independently associated with poorer IADL functioning. When health status was added

to that model, Black race/ethnicity was no longer a risk factor for worse IADL function. Such findings indicate that worse overall health status helps to explain the increased risk of disability in Blacks, though future research is needed to directly test this potential pathway. Interestingly, in this model, memory was also no longer associated with IADL disability, suggesting that the impact of memory on IADL function may also be accounted for by health status.

Next, we examined similar models that included executive functioning rather than verbal episodic memory. In the multivariate model unadjusted for self-rated health, older age, male gender, and worse executive function were all independently associated with worse IADL functioning. Latino participants were also more likely to show worse IADL functioning. After accounting for self-rated health, results remained the same. Unlike the models that included verbal episodic memory, the impact of executive functioning remained significant after including health status.

**Table 4.** Association Between Executive Functioning and IADL Difficulty

	Model 1				Model 2			
	OR	95% CI		<i>p</i> Value	OR	95% CI		<i>p</i> Value
		Lower	Upper			Lower	Upper	
Executive functioning	0.74	0.64	0.86	<.0001	0.84	0.73	0.98	.0223
Proportional odds assumption				.1020				.2345
Covariates								
Age	1.03	1.01	1.04	.0028	1.03	1.01	1.04	.0039
Male gender	0.48	0.38	0.62	<.0001	0.48	0.37	0.61	<.0001
Race/ethnicity								
Asian	0.78	0.56	1.09	.1464	0.78	0.55	1.09	.1432
Black	1.24	0.91	1.69	.1801	1.06	0.77	1.46	.7315
Latino	0.69	0.48	1.00	.0497	0.69	0.47	1.01	.0575
Mixed race	1.50	0.92	2.45	.1053	1.37	0.83	2.27	.2168
Years of education	1.01	0.97	1.05	.7937	1.03	0.99	1.08	.1262
Self-rated health					2.10	1.83	2.41	<.0001

Notes: CI = confidence interval; IADL = instrumental activities of daily living; OR = odds ratio. Model 1 adjusted for race/ethnicity, mixed race status, baseline age, gender, and years of education. Model 2 additionally adjusted for self-rated health at baseline. Score test was used to determine whether models upheld the proportional odds assumption; assumption is met if *p* > .05.

**Table 5.** Association Between Verbal Episodic Memory and Executive Functioning With IADL Difficulty

	Model 1				Model 2			
	OR	95% CI		<i>p</i> Value	OR	95% CI		<i>p</i> Value
		Lower	Upper			Lower	Upper	
Verbal episodic memory	0.93	0.81	1.08	.3355	0.96	0.82	1.11	.5343
Executive functioning	0.76	0.65	0.89	.0007	0.86	0.73	1.01	.0615
Proportional odds assumption				.1290				.2830
Covariates								
Age	1.02	1.01	1.04	.0071	1.02	1.01	1.04	.0077
Male gender	0.47	0.36	0.60	<.0001	0.47	0.36	0.61	<.0001
Race/ethnicity								
Asian	0.80	0.58	1.12	.1922	0.79	0.56	1.11	.1736
Black	1.24	0.91	1.69	.1778	1.06	0.77	1.46	.7300
Latino	0.69	0.48	1.01	.0533	0.70	0.48	1.02	.0596
Mixed race	1.50	0.92	2.44	.1079	1.37	0.83	2.27	.2188
Years of education	1.01	0.97	1.05	.7501	1.03	0.99	1.08	.1196
Self-rated health	1.01	0.97	1.05	.7937	2.10	1.83	2.41	<.0001

Notes: CI = confidence interval; IADL = instrumental activities of daily living; OR = odds ratio. Model 1 adjusted for race/ethnicity, mixed race status, baseline age, gender, and years of education. Model 2 additionally adjusted for self-rated health at baseline. Score test was used to determine whether models upheld the proportional odds assumption; assumption is met if *p* > .05.

To our knowledge, this is the first study that has examined the association between specific cognitive domains and IADL performance across racial/ethnic groups. When examined in separate models unadjusted for health status, both memory and executive functioning were related to IADL performance, and importantly, these relationships did not appear to substantially differ across racial/ethnic groups. Thus, our findings are consistent with the larger literature based on mostly NHW samples that suggests that memory and executive functioning are both associated

with IADL functions at least when measured separately (Cahn-Weiner et al., 2007; Carlson et al., 1999; Farias et al., 2013; Mansbach & Mace, 2019; Rovner et al., 2012). Overall executive functioning showed a stronger association with IADL than memory, and it was independent of health status, whereas memory was not. However, to further evaluate the relative importance of executive function and episodic memory to IADL function, we also ran joint models including both cognitive domains. In these joint models, unadjusted for self-rated health, executive



functioning remained a significant predictor of IADL difficulty, but memory did not. However, when self-rated health was added to the joint model, the results for both verbal episodic memory and executive functioning were attenuated such that there was only a trend-level association between executive function and IADLs and no relationship with episodic memory.

Our study has a number of strengths. The cohort is large and diverse, allowing a unique opportunity to examine potential differences in IADL disability and associated factors. This is the first study to examine the relationship between specific cognitive predictors (as opposed to a brief, global cognitive screening measure) and IADL functioning across multiple racial/ethnic groups, including NHWs, Blacks, Latinos, and Asians. Our measures of verbal episodic memory and executive function have been previously shown to have similar psychometric properties, lending credibility to the comparison of the impact of these cognitive domains on IADLs (Mungas et al., 2000, 2004; Mungas, Reed, Haan, et al., 2005; Mungas, Reed, Tomaszewski Farias, et al., 2005). An important extension of this work will be to examine whether there are disparities in change in IADLs over time across racial/ethnic groups and how specific cognitive abilities at study baseline and measured over time are associated with longitudinal decline in IADLs and loss of functional independence, questions this unique cohort is poised to help address.

This study has some limitations. First, the prevalence of IADL difficulty was relatively low in our sample (30%) with the majority of participants across all racial/ethnic groups reporting difficulty on no IADL items, as compared to other studies (40%; Centers for Disease Control and Prevention, 2018). Additionally, the current study evaluated only a limited number of IADLs; for example, it did not assess ability to manage medications and medical appointments, drive, and complete shopping. Further, IADL functioning was based on self-report, which can be susceptible to response bias. While it would have been ideal to include an objective medical comorbidity burden variable rather than self-rated health, these data are not currently available in this cohort. Additionally, some studies have shown cultural differences in self-rated health (e.g., Black older adults reported worse health compared to NHW older adults, despite comparable health status), although others have not (Chandola & Jenkinson, 2000; Strawbridge & Wallhagen, 1999). Nonetheless, difference in self-rated health in the current study could be related to cultural bias. We also recognize that aggregating Asians and Latinos as we did is not ideal because there is heterogeneity within these minority populations. Finally, the older adults in our minority groups were fairly well educated compared to older adults from those groups in the general population in the United States and had access to a health care system (that is how they were recruited), which may further limit the generalizability of our findings.

In summary, our study provides further evidence of disparities in functional disability particularly among Black older adults. To our knowledge, this is the first study that has examined the association between specific cognitive domains and IADL performance across multiple racial/ethnic groups. Our findings are consistent with the literature that suggests that executive functioning plays a particularly important role in IADL disability. However, self-rated health largely attenuates the relationship between IADL difficulty and cognition, suggesting health inequalities may at least partially explain IADL differences. Notably, our findings indicate that cognition was similarly associated with IADL disability across the four ethnoracial groups and does not appear to have differential patterns of relationships with IADLs across groups.

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## Conflict of Interest

None declared.

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