MEMORY PERFORMANCE AND MILD COGNITIVE IMPAIRMENT IN BLACK AND WHITE COMMUNITY ELDERS

Background: Deficits in memory performance are often nonspecific predictors of cognitive decline and may portend a diagnosis of mild cognitive impairment (MCI).

Objective: We examined age, depression, education, gender, memory complaints, and race as related to memory performance because memory is a fundamental criterion from which MCI is evaluated.

Methods: The study recruited Black and White adults, \geq 70 years of age, who lived in the community, spoke English, and were screened for no cognitive impairment. Bivariate analyses (*t* tests and Pearson correlations) and multiple regressions were performed.

Results: The sample consisted of 89 African Americans and 83 Caucasian Americans. Compared to their White counterparts, Blacks had lower educational attainment, had lower baseline cognition and memory performance, were more likely to report symptoms of depression, and were more likely to have impaired memory performance. In the overall sample 52% were classified as having a poor memory, and 25% of the Caucasians and 44% of the Blacks were classified as moderately or severely memory impaired; however no difference in memory complaints was observed between the groups. Sixteen percent of the sample reported clinically significant depressive symptoms. Age and race were the statistically significant predictors of memory performance in the multiple regression analysis, even accounting for education, depression, gender, and memory complaints.

Conclusions: Why race remains a unique predictor is an unresolved issue in need of future research. Finally, using the three criteria available in this data set, 44% of the Blacks and 35% of the Caucasians in this sample would qualify for a diagnosis of MCI. (*Ethn Dis.* 2007;17:381–388)

Key Words: Blacks, Depression, Memory Performance, Mild Cognitive Impairment (MCI), Older Adults

From the School of Nursing, The University of Texas at Austin, Austin, Texas.

Graham J. McDougall Jr., PhD, RN; Phillip W. Vaughan, MA; Taylor W. Acee, MA; Heather Becker, PhD

INTRODUCTION

Memory complaints and memory impairment are often tolerated and expected in the older adult population. Deficits in memory performance are often nonspecific predictors of cognitive decline and portend a diagnosis of mild cognitive impairment (MCI). MCI is a serious health issue in older adults.^{1,2} For example, those individuals who are diagnosed with the amnestic form of MCI progress to clinically diagnosable Alzheimer's disease at a rate of 10% to 15% per year. One characteristic of MCI that makes it difficult to recognize is that an individual has essentially normal everyday function. More fully understanding the demographic and psychological predictors of MCI could assist clinicians and researchers in improving diagnostic and prescriptive methods in this area. Because mild memory problems are sometimes signs of incipient MCI, then memory performance loss with aging is an important area of inquiry.

The five criteria for diagnosing MCI are not having dementia; having cognitive complaints not normal for the age of the individual; having memory impairment; having cognitive decline; and having essentially normal functional activities.¹ Therefore, when memory performance is worse than expected for Deficits in memory performance are often nonspecific predictors of cognitive decline and portend a diagnosis of mild cognitive impairment (MCI).

age, but a diagnosis of dementia is not possible because of a cognitive screening score within the normal range (eg, Mini Mental State Exam [MMSE] ≥ 23), then a diagnosis of MCI is considered as a possibility.³⁻⁷ Under these circumstances, the clinician must determine whether other cognitive domains are also impaired, eg, language, executive function, or visuospatial skills. If there were mild deficits in a number of different domains, the person would have multidomain MCI with or without a memory component. If the nonmemory domains were intact, the person would be classified as having amnestic MCI.1,8

Blacks have a disproportionate risk for developing mild cognitive impairment and dementia.^{9–15} Further, Black elders may be more likely than Whites to attribute these symptoms to other causes, such as physical ailments, stress, and anxiety.^{16–19} Nevertheless, memory complaints, another potential symptom in the MCI diagnosis, have long been associated with depressive symptoms and with cognitive decline in both Black and Caucasian older adults.^{20,21}

Address correspondence to Graham J. McDougall, Jr. PhD; School of Nursing; The University of Texas at Austin; 1700 Red River; Austin, TX 78701; 512-471-7936; 512-471-4910 (fax); gmcdougall@mail.nur. utexas.edu

Depression is also relevant to understanding MCI. Depression is a predictor of treatment noncompliance, memory impairment, and cognitive decline in both Black and White older adults.²²⁻³⁶ The results of two metaanalyses evaluating the association between depression and memory impairment in older adults concluded that though these phenomena were significantly associated, the negative effects of depression on memory performance were greater in younger and middleaged adults than in older adults.^{29,39} So while depression is in general likely to be associated with memory problems, this relationship might be less relevant for older adults. In addition to depression, a range of psychiatric and behavioral symptoms have been identified in community-dwelling older adults with cognitive impairment.^{25,30}

Individual characteristics such as age, gender, race, and education are often related to cognitive performance, but these associations may sometimes be due to bias in screening tests.40-45 Moreover, these variables could be correlated with each other as well as with depression and/or memory complaints. For example, Blacks might be more depressed than Whites on average, and women might have fewer years of education than men on average. Therefore, researchers must evaluate these predictors of performance not only individually but also simultaneously, as with multiple regression. Doing so allows inferences to be made regarding which predictor variables are most important in understanding performance.

This secondary analysis examined memory performance because it is a fundamental criterion from which mild cognitive impairment (MCI) is evaluated. The ability to differentiate between normal functioning and pathological changes in cognitive aging may be clarified by studies providing data for diverse samples of older adults. The original analysis found memory selfefficacy to be a significant predictor of memory performance for Whites but not Blacks.⁴⁶ Data relating to the first three of the five MCI criteria (no dementia, memory impairment, and memory complaints) were collected as part of this study. Information about depression, age, education, and ethnicity were also available. Though memory complaints are one of the MCI diagnostic criteria, memory impairment in particular was chosen as the dependent variable of interest in this study because of its centrality to the pathology of MCI. The relative ease with which patients' memory complaints may be assessed also suggests that this variable is better suited as a predictor than a criterion variable. Age, depression, education, gender, memory complaints, and race were both individually and simultaneously evaluated as predictors of memory performance so that the effects of each of these theoretically relevant predictor variables could be ascertained. A clearer understanding of how these variables relate to memory performance will enhance our understanding of the development of MCI, both in general and in terms of ethnic differences.

METHODS

Black and White adults \geq 70 years of age who lived in the community and spoke English were recruited. Individuals who agreed to participate were given the MMSE and were enrolled with a score of \geq 23. The Mini Mental State Exam (MMSE) was used as a screening measure for not having dementia.47 All of the White participants and 51 of the Blacks were recruited through a fourphase random telephone screening. An additional 38 Blacks were recruited through convenience sampling with snowball methods, for a sample of 89 Blacks.⁴⁸ The final sample consisted of 172 subjects, 83 Whites and 89 Blacks.

Memory complaint was measured with the change subscale of the Meta-

memory in Adulthood Questionnaire (MIA). The change subscale determines an individual's perception of his or her memory abilities as generally stable or subject to long-term decline. A higher score (>2.5) translates to greater stability of memory function. Older adults with varying levels of affective and cognitive function were distinguished by their responses to the items of the change scale.^{21,22,34} For example, when compared to community-residing older adults, nursing home residents with mild cognitive impairment scored significantly lower on change (2.44 vs 2.84).

Depression was measured with the Center for Epidemiological Studies Depression Scale (CES-D) used to identify depressive symptoms.⁴⁹ Individuals responded to the items on a four-point Likert-type scale; potential responses ranged from rarely or none of the time to most or all of the time. Scores could range from 0 to 60; higher scores indicated more depressive symptoms. A score ≥ 16 was considered to be in the depressed range. The CES-D has been tested with older African, Caucasian, and Mexican American adults and was stable when subscale and total scores were reported.36

Memory performance was measured with the Rivermead Everyday Behavioral Memory (RBMT), which was designed to reflect everyday memory performance.^{50,51} The standard profile score (SPS) of the RBMT (with clinical cut points to diagnosis memory impairment) was used as a measure of memory impairment. The components included remembering of a name (first and surname), a hidden belonging, an appointment, picture recognition, a brief news article (immediate and delayed), face recognition, a new route (immediate), a new route (delayed), a message, orientation, and date. The standard profile score (SPS) has a possible range from 0-24 and is sometimes interpreted with regard to cut points for four groups of memory function: normal (22-24),

	Convenience (N=38)		Random	(N=51)			
Variable	Mean	SD	Mean	SD	F	Р	d
Age	76.92	5.95	75.84	4.62	.93	.34	20
Education	9.49	2.89	11.00	2.55	6.84	.01	.56
MMSE	26.55	2.17	26.82	2.23	.33	.57	.12
Depression	8.47	7.37	11.23	9.38	2.22	.14	.33
Memory change	2.72	.63	2.51	.49	3.22	.08	38
Memory performance	16.47	3.89	17.16	3.84	.68	.41	.18

Table 1.	Differences	within	the African	American	group	by	recruitment	metho	ds
----------	-------------	--------	-------------	----------	-------	----	-------------	-------	----

MMSE=Mini Mental State Exam: a diagnostic measure of dementia (>22=no dementia).

Depression was measured by the Center for Epidemiological Studies-Depression Scale (>16=clinical depression).

Memory change was measured by the change subscale of the Metamemory in Adulthood questionnaire (>2.5=stable memory). NOTE: higher scores on this measure indicate fewer complaints.

Memory performance was measured by the Rivermead Standardized Profile Score (≤16=impaired memory).

poor (17-21), moderately impaired (10-16), and severely impaired memory (0-9).

ple linear regression analysis. SPSS versions 13 and 14 were used for all analyses.

Statistical Analysis

We reported descriptive statistics as means and standard deviations for continuous variables, or frequencies and percentages for categorical variables. Pearson correlation coefficients (or point-biserial correlation coefficients for the association between binary and continuous variables) were used to measure the relationship between memory performance and relevant demographic and clinical variables. We then reported the simultaneous relationship among the demographic and clinical variables as predictors of memory performance by using a multiRESULTS

Since we recruited Black elders by two different methods, telephone and convenience sampling, specifically by using snowball methods, we made comparisons to determine if there were differences between the two subsamples (Table 1). Of the Black elders, no significant differences in age, cognition, depression, memory performance or the metamemory change subscale between the telephone (n=51) and convenience (n=38) samples.⁴⁷ The convenience sample had significantly fewer years of education (9.49 vs 11.00, P=.01) than the telephone sample. Subsequent analyses grouped all Black participants together.

Racial Differences

Independent sample *t* tests were calculated between the Black and White groups on all study variables (Table 2). The White group had significantly ($P \le .001$) more years of education (13.07 vs 10.35) and scored higher than the Black group on the MMSE (M=28.22 vs 26.71). There were no significant age differences between the groups. There were significant group differences on memory performance. Blacks had lower standard profile scores compared to Whites (M=16.87 vs 18.40, respectively). Scores on the

Table 2.	Distribution	of	sample	characteristics	stratified	hv	race
Table 2.	Distribution	U	sample	characteristics	Suameu	IJΥ	race

	Total (N	=172)	African Ameri	can (<i>n</i> =89)	Caucasian	(<i>n</i> =83)			
Variable	Mean	SD	Mean	SD	Mean	SD	t	Р	d
Age	76.51	5.16	76.33	5.19	76.73	5.12	520	.59	08
Education	11.67	3.2	10.35	2.79	13.07	3.03	-6.126	<.01	93
MMSE	27.44	2.15	26.71	2.19	28.22	1.83	-2.785	<.01	75
Depression	8.6	7.75	10.04	8.64	7.05	6.37	2.601	<.01	.40
Memory complaints	2.62	.56	2.60	.56	2.65	.56	607	.54	09
Memory performance	17.6	3.68	16.87	3.86	18.40	3.32	-2.785	<.01	42

MMSE=Mini Mental State Exam: a diagnostic measure of dementia (>23=no dementia).

Depression was measured by the Center for Epidemiological Studies-Depression Scale (>16=clinical depression).

Memory complaints was measured by the change subscale of the Metamemory in Adulthood questionnaire (>2.5=stable memory). NOTE: higher scores on this measure indicate fewer complaints.

Memory performance was measured by the Rivermead Standardized Profile Score (≤16=impaired memory).

Memory Performance Category (score range)	African American ($n=89$)		Caucasian	(<i>n</i> =83)	Total (N=172)	
	Frequency	%	Frequency	%	Frequency	%
Normal (22–24)	7	7.9	17	20.5	24	14.0
Poor (17–21)	43	48.3	45	54.2	88	51.2
Moderately impaired (10–16)	35	39.3	20	24.1	55	32.0
Severely impaired (0–9)	4	4.5	1	1.2	5	2.9

Table 3.	Racial	differences	in	memory	performance	categories
----------	--------	-------------	----	--------	-------------	------------

CES-D showed great variability, with Blacks being more depressed on average (White M=7.05 \pm 6.37 vs Black $M=10.04 \pm 8.64$; P<.01). Twentyeight total individuals (16%) scored in the clinically depressed range (≥ 16), and a Pearson χ^2 analysis indicated that significantly more Blacks than the Caucasians scored in this range χ^2 (4, N=172) =7.24, P=.008. Race was significantly associated with education (White 13.1 ± 3.0 vs Black 10.4 ± 2.8 ; P < 0.01). There was not a significant group difference on memory complaints as operationalized by the MIA Change subscale.

Table 3 provides the frequency counts of the 172 participants categorized into four groups of memory function based on RBMT standard profile scores (the measure of memory performance): normal (n=24), poor memory (n=88), moderately impaired (n=55), and severely impaired (n=5). Among the Blacks, seven individuals were in the normal group, while the White group included 17 individuals categorized as normal. In the category of *poor* memory function the numbers of participants were similar (48% vs 54%). The *moderately impaired* group however, had almost twice as many African Americans as Caucasians (39% vs 24%), and in the *severely impaired* group, Blacks outnumbered Whites four to one.

Table 4 shows the descriptive statistics for the demographic and clinical variables in the study along with their correlation with memory performance. The mean age of 76.5 ± 5.2 years was consistent across gender, race, education, and depression groups. Age was significantly negatively correlated with memory performance. The sample was 32.5% male, and there was no

Table 4. Description of study variables and their bivariate relationship with memory performance

		Correlation with Memory Performance			
Variable Name $N = 172$	Mean ± SD % (frequency)	r	Р		
Age (years)	76.5 ± 5.2	25	<.01		
Gender (Male=1, Female=0)	32.5% (56)	.08	.31		
Race (Black=1, White=0)	48.3% (83)	21	<.01		
Education (years)	11.7 ± 3.2	.22	<.01		
Memory complaints	$2.6 \pm .6$.12	.13		
Depression	8.6 ± 7.8	.03	.72		
Memory performance	17.6 ± 3.7	1.00	_		

Depression was measured by the Center for Epidemiological Studies-Depression Scale (≥ 16 =clinical depression).

Memory complaints was measured by the change subscale of the Metamemory in Adulthood questionnaire (>2.5=stable memory). NOTE: higher scores on this measure mean fewer complaints.

Memory performance was measured by the Rivermead Standardize Profile Score (<16=impaired memory).

statistically significant correlation between gender and memory performance. The sample had an average of 11.7 ± 3.2 years of education, and education was significantly positively correlated with performance. Neither the depression scores from the CES-D nor the memory complaint scores from the MIA Change scale were related to memory performance.

To aid in interpreting the multiple regression, it is worth noting that besides being significantly associated with gender and race as noted above, years of education was also associated with depression (no depression 11.9 ± 3.2 vs depression 10.5 ± 2.9 ; P=.032). Gender was significantly associated with race (41.4% Black male vs 62.5% White male; P<.01) and years of education (males 13.0 ± 3.4 vs females 11.0 ± 2.9 ; P<.01).

The results of the multiple regression of memory performance on demographic and clinical variables are shown in Table 5. The regression model was statistically significant, F(6, 165)=4.26, P<.01, and explained 14% of the total variation in memory performance. The effects of age and race remained statistically significant at the conventional alpha level of .05 when moving from the bivariate analyses to this multivariate regression context. The relationship of education with memory performance may have been partially mediated in this sample by one or more other predictors in the multiple regression because it was weaker in this context and no longer statistically

Table 5. Predictors of memory performance: multiple linear regression model										
Variable	Standardized Coefficient (beta)	Unstandardized Coefficient	SE	Р						
Intercept		18.24	.47							
Age (years)	23	17	.05	<.01						
Gender (Male=1, Female=0)	.00	02	.59	.98						
Race (Black=1, White=0)	17	-1.22	.60	<.05						
Education (years)	.15	.17	.10	.09						
Memory complaints	.10	.63	.50	.20						
Depression	.07	.03	.04	.36						

epression

 $R^2 = .14$, adjusted $R^2 = .10$.

N=172.

Depression was measured by the Center for Epidemiological Studies-Depression Scale.

Memory complaints were measured by the Change subscale of the Metamemory in Adulthood questionnaire. NOTE: higher scores on this measure mean fewer complaints.

Memory performance was measured by the Rivermead Standardized Profile Score.

significant (b=.15, P=.09 versus r=.22, P<.01).

In addition, we tested whether physical or mental health might influence memory performance. To test this assumption, we performed a subsequent analysis that added both the general health subscale and the mental health subscale of the SF-36 Health Questionnaire to the regression model reported above. Neither predictor was significant (*P* values for the two coefficients were .79 and .46, respectively), and coefficients from the previous regression remained essentially unchanged (ie, race was still a statistically significant predictor of memory performance).

DISCUSSION

These secondary analyses provided an exploratory look at the factors associated with criteria that are used to classify mild cognitive impairment. This study had two major limitations. The first limitation was the representativeness of the sample; all participants were a community sample of elderly Blacks and Whites living independently from the same Midwestern city. Even though the original plan was to use telephone methods to recruit a quasi-random sample of Black elders, we had to change to snowball methods in order to recruit an adequate sample. Given this fact, a convenience sample was used to increase the sample size so that it reflected the ethnic makeup of the inner-city population being studied (44% Black and 56% Caucasian). The Black group may have suffered from more selection bias than the White group. The two subsamples of Blacks differed significantly on only one of the variables of interest (education).

The sampling methods might have tapped systematically different subgroups of Blacks; however, including the convenience subsample might have actually made the Black sample more representative of the Black elders in this city. For example, if Blacks who were more reachable by telephone were more affluent, our snowball method might have included greater numbers of economically disadvantaged Blacks. The fact that the convenience subsample had fewer years of education supports this idea. In any event, the possible importance of these differences is attenuated to some extent because we statistically controlled for education in the regression analyses by including it as a predictor.

Second, we were unable to evaluate two of the five criteria for MCI: whether or not the participant had normal everyday function and the extent, if any, of the participant's cognitive decline. But while this study did not test directly for functional activities of daily living, all individuals enrolled in the study had no dementia (MMSE \geq 23) and all were living independently. None of the participants were in assisted living or nursing homes.⁵²

There are several important findings from this study. First, in our sample, the Black and White elders scored higher on the RBMT than did older adults in other samples.^{3,50,53} Second, greater numbers of Black participants were in the moderately and severely impaired memory performance groups than were White participants. Finally, using the three criteria available in this dataset, 44% of Blacks and 35% of Caucasians in this sample would qualify for a diagnosis of MCI.

While neither Black nor White participants' memory complaint scores were below the clinical cutoff, most of these participants (52%) were classified into the "poor" category on the basis of RBMT scores. Greater numbers of Black participants were cognitively impaired according to these performance scores, yet Black participants exhibited no more memory complaints than did White participants. This absence of an observed racial difference in memory complaints despite an observed racial difference in memory performance could be interpreted as consistent with the findings of other researchers who reported that older Blacks were less likely to report dysphoria than were older Whites.^{31,33,36} Moreover, memory complaints were weakly and nonsignificantly related to memory performance in both the bivariate and the multivariate analyses for the overall sample. These findings differ from those of previous research in this area that has found memory complaints to be associated with memory performance.^{8,16,20,21}

Similarly, CES-D scores were unrelated to memory performance in both the bivariate and multivariate analyses, despite the fact that the Black Of the six predictor variables considered in this study (gender, race, age, education, depression, and memory complaints), only age, race, and education were linked with memory performance in the bivariate analyses

participants were more depressed on average and also scored lower on memory performance. Prior research has linked depression with lower memory performance,^{12,23,29,39} and so the present findings are noteworthy. Twenty-eight (16.3%) of the total participants in this study reported clinically significant levels of depressive symptoms on the CES-D. In three population-based studies that used the CES-D with Black females, the percentages of individuals with high levels of depressive symptoms were 14%35,37 and 19%.³⁸ Despite the lack of association between depression and memory performance in this sample, depression has been associated with memory complaints in numerous studies^{3,5,7,20,29} and often precedes cognitive impairment and Alzheimer's disease.^{12,23} The significant differences in depression scores between the Black and White groups in this study may have relevance for determining the independence of living arrangements of vulnerable and frail older adults.

Of the six predictor variables considered in this study (gender, race, age, education, depression, and memory complaints), only age, race, and education were linked with memory performance in the bivariate analyses. The multiple regression analysis elaborated on these findings to show that only age and race had net effects that were statistically significant at the conventional alpha level of .05, though the effect of education was still somewhat notable (standardized coefficient =.15).

Researchers have suggested that a combination of age, education, and socioeconomic status may predict cognitive function,^{11,13,14,20,54,55} but findings regarding age have been equivocal. For example, in the MacArthur study of successful aging, age did not predict memory performance in either the African or Caucasian American groups.⁵⁷ In Zelinski and Gilewski,⁵⁶ however, age was negatively associated with performance as with the present sample.

Blacks in this sample tended to exhibit worse memory performance than Whites, even with the other predictors of interest statistically held constant. If differences in age, gender, education, depression, and memory complaints across the two racial groups are not responsible, then what is? One possibility is that physical and mental health differences were responsible; however a regression analysis did not support that assumption. Another possibility is that socioeconomic status in general, more than education level specifically, was responsible. Future investigations should consider a broader representation of socioeconomic status factors.

This study provides data on the everyday memory function of a mixed racial sample of community-residing Black and White older adults. Because mild memory problems are sometimes an early sign of MCI or of Alzheimer's disease, and because intact memory function is essential to live independently, then memory loss with aging is a worthwhile area of inquiry. The continued investigation of memory performance and cognitive aging in real world contexts with diverse samples of older adults will advance knowledge of memory performance, MCI, and incipient Alzheimer's disease.

ACKNOWLEDGMENTS

The funding was provided by NINR Grant R15 NR0420. Thanks to the graduate nursing students from the Frances Payne Bolton School of Nursing at Case Western Reserve University who assisted with this project. The preliminary statistical analyses by Kristopher L. Arheart, EdD is acknowledged.

REFERENCES

- Winblad B, Palmer K, Kivipelto M, et al. Mild cognitive impairment–beyond controversies, toward a consensus: report of the International Working Group on Mild Cognitive Impairment. J Intern Med. 2004;256(3):240–246.
- Bennett DA, Schneider JA, Bienias JL, Evans DA, Wilson RS. Mild cognitive impairment is related to Alzheimer disease pathology and cerebral infarctions. *Neurology*. 2005;64: 834–841.
- Derouesne C, Alperovitch A, Arvay N, et al. Memory complaints in the elderly: a study of 367 community-dwelling individuals from 50 to 80 years old. *Arch Gerontol Geriatr Suppl.* 1989;1:151–163.
- Grut M, Jorm AE, Fratiglioni L. Memory complaints of elderly people in a population survey: variation according to dementia stage and depression. *J Am Geriatrics Soc.* 1993;41: 1295–1300.
- Schofield PW, Marder K, Dooneief G, Jacobs DM, Sano M, Stern Y. Association of subjective memory complaints with subsequent cognitive decline in community-dwelling elderly individuals with baseline cognitive impairment. *Am J Psychiatry*. 1997;154: 609–615.
- Comijs HC, Deeg DJ, Dik MG, Twisk JW, Jonker C. Memory complaints; the association with psycho-affective and health problems and the role of personality characteristics. A 6-year follow-up study. J Affect Disord. 2002;72(2): 157–165.
- Geerlings MI, Jonker C, Bouter LM, Ader HJ, Schmand B. Association between memory complaints and incident Alzheimer's disease in elderly people with normal baseline cognition. *Am J Psychiatry*. 1999;156(4):531– 537.
- Smith GE, Petersen RC, Ivnik RJ, Malec JF, Tangalos EG. Subjective memory complaints, psychological distress, and longitudinal change in objective memory performance. *Psychol Aging*. 1996;11(2):272–279.
- Leveille SG, Guralnik JM, Ferrucci L, Corti MC, Kasper J, Fried LP. Black/White differences in relationship between MMSE scores and disability: women's health and aging study. J Gerontol B Psychol Sci Soc Sci. 1998;53: P201–P208.

MEMORY PERFORMANCE AND MILD COGNITIVE IMPAIRMENT - McDougall et al

- Fillenbaum G, Heyman A, Williams K, Prosnitz B, Burchett B. Sensitivity and specificity of standardized screens of cognitive impairment and dementia among elderly Black and White community residents. *J Clin Epidemiol.* 1990;43:651–660.
- Fillenbaum GG, Heyman A, Huber MS, et al. The prevalence and 3-year incidence of dementia in older Black and White community residents. *J Clin Epidemiol.* 1998;51(7): 587–595.
- Green RC, Cupples LA, Kurz A, et al. Depression as a risk factor for Alzheimer disease: the MIRAGE Study. *Arch Neurol.* 2003;60:753–759.
- Jones RN. Racial bias in the assessment of cognitive functioning of older adults. *Aging Ment Health*. 2003;7(2):83–102.
- Shadlen MF, Larson EB, Gibbons LE, et al. Ethnicity and cognitive performance among older African Americans, Japanese Americans, and Caucasians: the role of education. *JAGS*. 2001;49(10):1371–1378.
- Stewart AL, Napoles-Springer A. Advancing health disparities research: can we afford to ignore measurement issues? *Med Care*. 2003; 41:1207–1220.
- Jonker C, Geerlings MI, Schmand B. Are memory complaints predictive for dementia? A review of clinical and population-based studies. *Int J Geriatr Psychiatry.* 2000;15(11): 983–991.
- Tierney MC, Szalai JP, Snow WG, et al. Prediction of probable Alzheimer's disease in memory-impaired patients: a prospective longitudinal study. *Neurology*. 1996;46(3): 661–665.
- Tierney MC, Szalai JP, Dunn E, Geslani D, McDowell I. Prediction of probable Alzheimer disease in patients with symptoms suggestive of memory impairment: value of the Mini-Mental State Examination. *Arch Fam Med.* 2000;9(6):527–532.
- Bazargan M, Barbre AR. The effects of depression, health status, and stressful lifeevents on self-reported memory problems among aged Blacks. *Int J Aging Hum Dev.* 1994;38:351–362.
- Blazer DG, Hays JC, Fillenbaum GG, Gold DT. Memory complaint as a predictor of cognitive decline: a comparison of African American and White elders. J Aging Health. 1997;9:171–184.
- Purser JL, Fillenbaum GG, Wallace RB. Memory complaint is not necessary for diagnosis of mild cognitive impairment and does not predict 10-year trajectories of functional disability, word recall, or short portable mental status questionnaire limitations. J Am Geriatr Soc. 2006;54(2):335–338.
- 22. Lee JS, Potter GG, Wagner HR, Welsh-Bohmer KA, Steffens DC. Persistent mild

cognitive impairment in geriatric depression. *Int Psychogeriatr.* 2006;12:1–11.

- Bassuk SS, Berkman LF, Wypij D. Depressive symptomatology and incident cognitive decline in an elderly community sample. *Arch Gen Psychiatry*. 1998;55(12):1073–1081.
- Jorm AF, Christensen H, Korten AE, Jacomb PA, Henderson AS. Memory complaints as a precursor of memory impairment in older people: a longitudinal analysis over 7–8 years. *Psychol Med.* 2001;31(3):441–449.
- 25. Chan DC, Kasper JD, Black BS, Rabins PV. Prevalence and correlates of behavioral and psychiatric symptoms in community-dwelling elders with dementia or mild cognitive impairment: the Memory and Medical Care Study. Int J Geriatr Psychiatry. 2003;18(2): 174–182.
- Comijs HC, Jonker C, Beekman AT, Deege DJ. The association between depressive symptoms and cognitive decline in communitydwelling elderly persons. *Int J Geriatr Psychiatry*. 2001;16:361–367.
- Paterniti S, Verdier-Taillefer MH, Dufouil C, Alperovitch A. Depressive symptoms and cognitive decline in elderly people. Longitudinal study. *Br J Psychiatry*. 2002;181:406–410.
- Wilson RS, Barnes LL, Mendes deLeon CF, et al. Depressive symptoms, cognitive decline, and risk of AD in older persons. *Neurology*. 2002;59:364–370.
- Burt DB, Zembar MJ, Niederehe G. Depression and memory impairment: a metaanalysis of the association, its pattern, and specificity. *Psychol Bull.* 1995;117:285–305.
- Lopez OL, Becker JT, Sweet RA. Noncognitive symptoms in mild cognitive impairment subjects. *Neurocase*. 2005;11(1):65–71.
- Gallo JJ, Cooper-Patrick L, Lesikar S. Depressive symptoms of Whites and African Americans aged 60 years and older. J Gerontol B Psychol Sci Soc Sci. 1998;53(5): P277–P286.
- Katon WJ, Lin E, Russo J, Unutzer J. Increased medical costs of a population-based sample of depressed elderly patients. *Arch Gen Psychiatry*. 2003;60(9):897–903.
- Blazer DG, Hybels CF, Pieper CF. The association of depression and mortality in elderly persons: a case for multiple, independent pathways. *J Gerontol A Biol Sci Med Sci.* 2001;56:M505–M509.
- McDougall GJ. Memory awareness in nursing home residents. *Geronology*. 1998;44:281– 287.
- Callahan CM, Wolinsky FD. The effect of gender and race on the measurement properties of the CES-D in older adults. *Med Care*. 1994;32:341–356.
- Blazer DG, Landerman LR, Hays JC, Simonsick EM, Saunders WB. Symptoms of depression among community-dwelling elderly

Black and White older adults. *Psychol Med.* 1998;28:1311-1320.

- Foley KL, Reed PS, Mutran EJ, DeVellis RF. Measurement adequacy of the CES-D among a sample of older Blacks. *Psychiatry Res.* 2002;109:61–69.
- Baker FM, Okwumabua J, Philipose V, Wong S. Screening Black elderly for the presence of depressive symptoms: a preliminary investigation. *J Geriatr Psychiatry Neurol.* 1996;9:127– 132.
- Kindermann SS, Brown GG. Depression and memory in the elderly: a meta-analysis. J Clin Exp Neuropsychol. 1997;19:625–642.
- Snowdon DA, Ostwald SK, Kane RL. Education, survival, and independence in elderly Catholic sisters, 1936–1988. *Am J Epidemiol.* 1989;130(5):999–1012.
- Crum RM, Anthony JC, Bassett SS, Folstein MF. Population-based norms for the Mini-Mental state examination by age and educational level. *JAMA*. 1993;269(18):2386–2391.
- 42. White L, Katzman R, Losonczy K, et al. Association of education with incidence of cognitive impairment in three established populations for epidemiologic studies of the elderly. J Clin Epidemiol. 1994;47(4):363–374.
- Butler SM, Ashford JW, Snowdon DA. Age, education, and changes in the Mini-Mental State Exam scores of older women: findings from the Nun Study. J Am Geriatr Soc. 1996;44(6):675–681.
- Christensen H, Korten AE, Jorm AF, et al. Education and decline in cognitive performance: compensatory but not protective. *Int J Geriatr Psychol.* 1997;12:323–330.
- 45. Schmand B, Smit JH, Geerlings MI, Lindeboom J. The effects of intelligence and education on the development of dementia. A test of the brain reserve hypothesis. *Psychol Med.* 1997;27(6):1337–1344.
- McDougall GJ. Memory self-efficacy and memory performance among Black and White elders. *Nurs Res.* 2004;53:323–331.
- Folstein MF, Folstein SE, McHugh PR. Minimental state: a practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res.* 1975;12:189–198.
- McDougall GJ, Holston EC, Wilke P. Recruiting African Americans into research on cognitive aging. *Ethn Dis.* 2001;11:124– 133.
- Radloff LS, Teri L. Use of the center for epidemiological studies-depression scale with older adults. *Clin Gerontol.* 1986;5:119–136.
- Cockburn J, Smith PT. The Rivermead Behavioural Memory Test. Supplement 3: Elderly People. Bury St Edmunds, Suffolk, UK: Thames Valley Test Co; 1989.
- Wilson B, Cockburn J, Baddeley A, Hiorns R. The development and validation of a test battery for detecting and monitoring everyday

MEMORY PERFORMANCE AND MILD COGNITIVE IMPAIRMENT - McDougall et al

memory problems. J Clin Exp Neuropsychol. 1989;11:855–870.

- Petersen RC, Doody R, Kurz A, et al. Current concepts in mild cognitive impairment. Arch Neurol. 2001;58(12):1985–1992.
- 53. Van Balen HGG, Westzaan PSH, Mulder T. Stratified norms for the Rivermead Behavioural memory test. *Neuropsychol Rehabil.* 1996;6(3):203–217.
- Black SA, Rush RD. Cognitive and functional decline in adults aged 75 and older. J Am Geriatr Soc. 2002;50(12):1978–1986.
- Herzog AR, Wallace RB. Measures of cognitive functioning in the AHEAD study. *J Gerontol B Psychol Sci Soc Sci.* 1997;special issue:37–48.
- Zelinski EM, Gilewski MJ. Effects of demographic and health variables on Rasch scaled cognitive scores. *J Aging Health.* 2003; 15(3):435–464.
- Whitfield KE, Fillenbaum GG, Pieper C, et al. The effect of race and health-related factors on naming and memory. *J Aging Health.* 2000; 12:69–89.

AUTHOR CONTRIBUTIONS

Design concept of study: McDougall, Vaughan Acquisition of data: McDougall Data analysis and interpretation: McDougall, Vaughan, Acee, Becker

Manuscript draft: McDougall, Vaughan, Acee, Becker

Statistical expertise: Vaughan, Acee, Becker

Acquisition of funding: McDougall

Administrative, technical, or material assistance: Vaughan, Acee