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Both Financial and Cognitive Decline Predict Clinical Progression in MCI

Adam Gerstenecker, Ph.D.[1], **Kristen L. Triebel, Psy.D.**[1,2], **Roy Martin, Ph.D.**[1,2], **Scott Snyder, Ph.D.**[3], and **Daniel C. Marson, Ph.D., J.D.**[1,2]

Adam Gerstenecker: atgers@uab.edu; Kristen L. Triebel: ktriebel@uab.edu; Roy Martin: rmartin@uab.edu; Scott Snyder: ssnyder@uab.edu; Daniel C. Marson: dmarson@uab.edu

[1]Department of Neurology, University of Alabama at Birmingham, Birmingham, AL

[2]Alzheimer's Disease Center, University of Alabama at Birmingham, Birmingham, AL

[3]Department of Education, University of Alabama at Birmingham, Birmingham, AL

Abstract

We investigated the roles of financial/functional and cognitive abilities in predicting clinical progression in patients with mild cognitive impairment (MCI). In a longitudinal sample of 51 patients with consensus-conference diagnosed MCI likely due to Alzheimer's disease (AD). Two-year change scores were calculated for a performance measure of functional ability, cognitive variables, and three outcome measures used to track progression in neurologic disorders. We examined patterns of financial and cognitive decline across the two-year study period, and used this data and the three outcome variables to construct discrete predictor models of clinical progression in MCI. We found that both financial skills and cognitive abilities declined over the two-year study period, were significantly associated with clinical progression, and contributed unique variance all three predictor models. The resulting models accounted for 40–75% of variance in clinical progression across outcome variables. Taken together, our results indicate that changes in both cognitive abilities and higher-order functional skills appear integral to understanding clinical progression in MCI likely due to AD. Specifically, declines in financial skills contribute unique variance to measures commonly used to track progression in neurological disorders associated with aging and thus represent an important functional marker of clinical progression in prodromal AD.

Keywords

mild cognitive impairment; functional impairment; Alzheimer's disease; progression; cognition

Introduction

Financial capacity refers to a person's ability to carry out financial tasks and make sound decisions in financial matters. Financial capacity is comprised of a broad range of

Corresponding Author, Daniel Marson, JD, PhD, Professor, Department of Neurology, University of Alabama at Birmingham, Sparks Center 650, Birmingham, AL 35294, dmarson@uab.edu, phone: (205) 934-2334, fax: (205) 975-3094.

Adam Gerstenecker, PhD[1] and Kristen Triebel, PsyD[1,2] conducted all statistical analyses

conceptual, pragmatic, and judgment abilities, ranging from basic skills (e.g., counting coins) to more complex skills (e.g., paying bills and using a checkbook)[1]. Given that many of these skills require higher-order functional ability, financial capacity is associated with personal autonomy and disability[2–4] and is critical to successful independent living[5,6].

Impairments in financial skills and judgment have been shown to be one of the first functional changes demonstrated by patients with mild cognitive impairment (MCI)[7], and significant declines in financial skills represent important markers in the progression of MCI[8]. For example, in a prior study, we detected declines in checkbook management skills and overall financial skills in a sample of patients with MCI who progressed to dementia due to Alzheimer's disease a year later[8]. However, compared to studies examining cognitive change, there have been relatively few studies evaluating change in aspects of higher-order functional skills as a predictor of clinical progression in MCI. In these studies[9–16], changes in functional abilities are consistently linked to progression in MCI, with higher-order functional skills particularly implicated.

Even fewer studies have examined the combined effects of functional abilities and cognition on progression in MCI. In one such study, a model combining measures of functional status, immediate verbal recall, and MRI hippocampal and entorhinal cortex volume was able to predict conversion from MCI to AD during a three-year period with a high degree of accuracy[12]. Results of another study indicated that baseline global cognitive status and one year change scores on measures of executive function and functional status predicted conversion over the course of a year[15]. Although these studies outline important findings, limitations are noted. For instance, progression was based on conversion to dementia, despite several markers of progression likely being present before conversion has occurred. In addition, functional status was assessed via informant report despite performance based measures being more sensitive to functional change[17].

In the current study, we investigated the contributions of financial and cognitive variables to progression in patients with MCI likely due to AD. Specifically, using a performance-based measure of financial capacity, and a set of cognitive variables sensitive to change in dementia, we (1) analyzed longitudinal change in functional and cognitive skills over a two-year period, and (2) employed these variables to develop three models of clinical progression in MCI using three well-established outcome measures in dementia. We hypothesized that a combination of performance based functional and cognitive variables would predict clinical progression in participants with MCI.

Method

Participants

Potential study participants included 143 people diagnosed with MCI who were recruited as part of a longitudinal study of functional change in MCI (Cognitive Observations in Seniors) (COINS) (AG021927). COINS participants have previously been described in detail[18]. For inclusion in the current study, participants needed to have completed both baseline and two-year follow-up that consisted of a neurocognitive battery and functional assessment. Of the 143 potential study participants, 52 completed both baseline and two-year follow-up

neuropsychological and functional assessments. One patient was excluded due to unusually large two year change scores that significantly deviated from sample averages. Thus, 51 participants comprised the final sample. Participants completing and not completing both baseline and two-year follow-up neuropsychological and functional assessments did not differ significantly in age, education, gender, neurocognitive performance, or functional ability. Thus, exclusionary criteria were not considered to bias the study sample.

Median length of observation was 25 months (range of 17–34 months). Diagnoses of MCI were made by the study's diagnostic consensus conference team, which consisted of neurologists, neuropsychologists, and nursing staff.

Participants met Winblad and Petersen diagnostic criteria for MCI[19] and were found to be free from any psychiatric disorder that could compromise cognition or other neurological condition. Criteria for MCI used in this study included: (1) subjective cognitive complaint by the patient and/or a knowledgeable informant; (2) objective impairment on at least one cognitive test (1.5 SD or more below appropriate norms); (3) overall preserved general cognitive functioning according to neuropsychological test results; (4) largely intact functional abilities based on informant ratings on the Forsyth Functional Capacity Form[20], and (5) absence of dementia.

All procedures were approved by the UAB institutional review board. All study participants provided written informed consent.

Measures of Cognitive Ability

Attention—The Attention subscale from the DRS-2 measures working memory and the ability to attend to and execute verbal and visual commands of varied complexity. We also used the Digit Span subtest from the Wechsler Memory Scale – Third Edition (WMS-III)[21], which is a measure of auditory verbal attention/concentration in which subjects repeat orally presented digit strings.

Semantic Knowledge—We used a semantic verbal fluency measure in which participants are given one minute to name as many animals as they can (Animal Naming)[22].

Verbal Memory—The California Verbal Learning Test – Second Edition (CVLT-II)[23] is a measure of auditory verbal learning and memory. Participants are asked to learn 16 words over five learning trials, and then are tested on short and delayed free recall.

Visual Memory—We used the Visual Reproduction I and II subtests from the WMS-III to evaluate visual memory. After visually scanning a design for ten seconds, participants are asked to reproduce the design, both immediately and after a delay.

Processing Speed and Executive Function—We used Trail Making Test Parts A and B (TMT)[24] which are measures of processing speed and executive function (set shifting), respectively.

Measure of Functional Ability

As our measure of functional ability, we used the Financial Capacity Inventory (FCI)[1,8,25] which directly assesses financial skills across nine domains and two global scores. The domains vary in complexity and include basic monetary skills, financial conceptual knowledge, cash transactions, checkbook management, bank statement management, financial judgment, bill payment, knowledge of assets and estate arrangements, and investment decision making. The domain related to knowledge of assets and estate arrangements is experimental and was not utilized in the current study.

Measure of Mood

The Geriatric Depression Scale (GDS)[26] is a self-report measure of depression specifically designed for use with an older adult population. The scale consists of 30 questions pertaining to depressive symptoms experienced over the past week.

Measures of Clinical Progression

We utilized change scores on three measures commonly used to track clinical progression in dementing disorders[27–29]:

1. Dementia Rating Scale – Second Edition (DRS-2)[30]
2. Mini-Mental State Examination (MMSE)[31], and
3. CDR and its Sum of Boxes score (CDR-SOB)[32].

The DRS-2 is a measure of general cognitive functioning that yields a total score and five subscale scores: Attention, Construction, Conceptualization, Initiation/Perseveration, and Memory. The MMSE is a brief screening measure of general cognitive functioning and dementia. Total scores range from 0–30. The CDR is a dementia staging measure that evaluates six domains: memory, orientation, judgment and problem solving, community affairs, home and hobbies, and personal care. The CDR-SOB score is computed by summing the six individual domains, with total scores ranging from 0 to 18. The DRS-2 and MMSE were administered using standardized testing procedures. CDR-SOB scoring was based on a review of the neurologist's clinical research findings, the participant's cognitive test performance, and the report of a collateral source about functional activities.

Data and Statistical Analyses

Means and standard deviations or frequency counts were calculated for baseline demographic, cognitive, financial capacity, and other data. A series of paired t-tests were conducted to determine if performance at Year 2 was significantly poorer than baseline performance for cognitive and functional variables. Two-year change scores were then calculated for these variables and also the three clinical progression measures (DRS-2 total, MMSE, and CDR-SOB). Pearson product moment correlations were used to examine the relationship between age, education, depressive symptoms, functional change scores, and cognitive change scores, and the three different two-year progression change scores.

Variables significantly associated with two-year progression change scores were used to construct the three predictor models. Specifically, for each model, a hierarchical linear

regression was conducted to predict two-year change scores for each progression outcome measure. To control for the effects of baseline performance on progression, baseline progression measure scores were entered in the first block (single entry) and cognitive and functional variables were entered in the second block (stepwise entry). For all models, relative predictive power was obtained through R^2. To allow for uniformity between the number of functional and cognitive variables considered for inclusion in each model, eight measures of cognition spanning a range of cognitive domains were chosen to match the eight FCI domain variables. For the MMSE and CDR-SOB models, DRS-2 Attention was used as a measure of attention; for the DRS-2 model, Digit Span was used.

Due to the number of comparisons, a conservative alpha of .01 was used for all analyses.

Results

Baseline Sample Characteristics

The baseline sample consisted of 28 men and 24 women with a mean age of 71 years (SD=6.6, range=56–91) and a mean education of 14.9 years (SD=3.3, range=6–20). The sample was comprised of Caucasian (82.7%) and African-American (17.3%) participants. Of the 51 participants with MCI, nine (18%) were considered to have transitioned to mild AD by Year 2.

Two-Year Change Scores in Functional and Cognitive Abilities

Table 1 lists mean performance scores for baseline and Year 2 on the eight FCI domains evaluated in this study. Checkbook management, bank statement management, and investment decision making showed significant decline at Year 2, and bill payment and conceptual knowledge approached significance. Basic monetary skills and cash transactions did not show significant decline at Year 2.

Table 1 also lists mean performance scores for baseline and Year 2 on the nine cognitive tasks used in this study. CVLT-II Trials 1–5 Total was the only cognitive task showing significant decline over two years.

Two Year Changes Scores on Measures of Clinical Progression

All measures of clinical progression were significantly correlated at baseline except for DRS-2 Total and CDR-SOB. All measures of clinical progression were significantly correlated at Year 2.

Scores on the three measures used to define MCI clinical progression were significantly poorer at Year 2 than at baseline, with medium (i.e., DRS-2 and MMSE) to large (CDR-SOB) effect sizes (Table 2).

DRS-2 Clinical Progression Model

In order of effect size, the following FCI domains showed significant association with DRS-2 change scores: checkbook management (r=−0.745, p<0.001), conceptual knowledge (r=−0.657, p<0.001), cash transactions (r=−0.650, p<0.001), basic monetary skills (r=

−0.578, $p<0.001$), bank statement management ($r=-0.573$, $p<0.001$), bill payment ($r=-0.552$, $p<0.001$), and financial judgment ($r=-0.452$, $p=0.001$). Investment decision making was not significantly associated with DRS-2 change scores ($r=0.194$, $p=0.176$).

A number of cognitive variables also showed significant association with DRS-2 change scores. In order of effect size, these were: TMTA ($r=-0.757$, $p<0.001$), Animal Naming ($r=0.601$, $p<0.001$), Digit Span ($r=0.459$, $p=0.002$), and TMTB ($r=-0.366$, $p=0.009$). CVLT-II 5 trial total ($r=0.322$, $p=0.023$) approached significance. Cognitive variables that did not show associations with DRS-2 changes scores were Visual Reproduction (VR) I and II ($r=0.197$, $p=0.175$ and $r=0.156$, $p=0.283$, respectively), and CVLT-II delayed free recall ($r=0.041$, $p=0.780$). Demographic and clinical variables of age ($r=-0.009$, $p=0.945$), education ($r=0.040$, $p=0.748$), and depression ($r=-0.016$, $p=0.900$) were not significantly related to DRS-2 change scores.

The final DRS-2 model consisted of one cognitive variable and two functional variables. Following entry of DRS-2 baseline scores, the initial predictor identified was a cognitive measure of processing speed (TMTA, 38% of variance), which was followed by an FCI domain predictor (cash transactions, additional 9% of variance), and finally by another functional predictor (FCI checkbook management, additional 4% of variance). The resulting model accounted for 75% of the variance in DRS-2 change scores (Table 2).

MMSE Clinical Progression Model

Clinical progression in the MCI group as measured by MMSE change scores were associated with the following FCI domains: checkbook management ($r=-0.689$, $p<0.001$), basic monetary skills ($r=-0.631$, $p<0.001$), bank statement management ($r=-0.556$, $p<0.001$), conceptual knowledge ($r=-0.543$, $p<0.001$), cash transactions ($r=-0.534$, $p<0.001$), and bill payment ($r=-0.458$, $p=0.001$). Financial judgment ($r=-0.346$, $p=0.012$) approached significance. Investment decision making ($r=0.103$, $p=.473$) was not significantly associated with MMSE change scores.

Cognitive variables associated with clinical progression as measured by MMSE change scores were TMTA ($r=-0.757$, $p<0.001$), Animal Naming ($r=0.615$, $p<0.001$), Digit Span ($r=0.496$, $p<0.001$), and CVLT-II 5 trial ($r=0.390$, $p=0.005$). VRI ($r=0.266$, $p=0.065$) approached significance. Cognitive variables not showing an association with MMSE change scores were Trails B ($r=-0.220$, $p=0.124$), CVLT-II delayed free recall ($r=0.040$, $p=0.784$), and VRII ($r=-0.029$, $p=0.841$).

Demographic and clinical variables of age ($r=0.063$, $p=0.621$), education ($r=-0.041$, $p=0.749$), and depression ($r=-0.128$, $p=0.315$) were not significantly associated with progression according to MMSE change scores.

The final MMSE progression model consisted of two functional variables and one cognitive variable. Following entry of MMSE baseline scores, the initial predictor identified was the FCI domain of checkbook management (28% of variance), which was followed by the FCI domain of basic monetary skills (additional 10% of variance), and finally by the cognitive

variable of CVLT-II five trial learning, additional 5% of variance). Our predictor model accounted overall for 48% of the variance in MMSE change scores (Table 3).

CDR-SOB Clinical Progression Model

Clinical progression in the MCI group as measured by CDR-SOB change scores was associated with the following FCI domains: checkbook management (r=−0.614, p<0.001), bank statement management (r=−0.591, p<0.001), cash transactions (r=−0.576, p<0.001), conceptual knowledge (r=−0.563, p<0.001), basic monetary skills (r=−0.536, p<0.001), bill payment (r=−0.501, p<0.001), and financial judgment (r=−0.374, p=0.006). Investment decision making was not significantly associated with progression according to CDR-SOB change scores (r=0.006, p=.966).

Cognitive variables associated with CDR-SOB change scores were Animal Naming (r=−0.564, p<0.001), TMTA (r=0.526, p<0.001), Digit Span (r=−0.443, p=0.001), VRI (r=−0.417, p=0.003), and CVLT-II five trial learning (r=−0.400, p=0.004). CVLT-II delayed free recall (r=−0.312, p=0.027) approached significance. TMTB (r=0.232, p=0.105) and VRII (r=−0.101, p=0.488) were not significantly correlated with CDR-SOB change scores.

Demographic and clinical variables of age (r=0.075, p=0.551), education (r=−0.141, p=0.260), and depression (r=0.100, p=0.422) were not significantly correlated with CDR-SOB change scores.

The final CDR-SOB progression model consisted of two cognitive variables and one functional variable. Following entry of CDR-SOB baseline scores, the initial predictor was the cognitive variable of Animal Naming (17% of variance), which was followed by the cognitive variable of immediate VRI (additional 17% of variance), and finally by the FCI domain of cash transactions (additional 5% of variance). The resulting model accounted for 40% of the variance in CDR-SOB change scores (Table 4).

It should be noted that, for each of the three progression models discussed above, at least one functional variable was retained in the final model.

Discussion

In this paper, we investigated the roles of financial and cognitive abilities in predicting clinical progression in patients with MCI likely due to AD. Although financial capacity is a higher-order functional skill that has been shown to decline in patients with MCI[8], to our knowledge, no studies have examined the combined impact of financial capacity and cognition on clinical progression in the disorder. Our results indicate that *both* higher order functional skills and cognitive abilities show decline over a two-year period in a sample of people with MCI presumably due to AD. In addition, *both* functional and cognitive skills are associated with clinical progression in these patients as measured by three well-established clinical outcome instruments. Finally, each of the three predictor models of clinical progression retained *both* functional and clinical variables as final predictors. In sum, our results indicate that functional skills represent an important marker in the progression of MCI prior to the point of conversion to AD.

The pattern of associations between performances on the functional and cognitive measures and measures of clinical progression utilized in our study highlight the important role of functional change to progression in clinical MCI. In the current study, we defined clinical progression using three measures useful for tracking progression in neurological diseases (i.e., DRS-2, MMSE, and CDR Sum of Boxes)[27,28,29], and our MCI group demonstrated significant decline on all three measures at Year 2 compared to baseline. Of the eight financial capacity domains evaluated in this study, six were associated with all three indices of clinical progression, seven were associated with two indices of clinical progression, and only one was not associated with any index of clinical progression. In comparison, three cognitive domains were associated with all three indices of clinical progression, four were associated with two indices of clinical progression, five were associated with one index of clinical progression, and two were not associated with any index of clinical progression. In sum, these sets of analyses demonstrate that *both* financial skills and cognition contribute to clinical progression in this sample of people with aMCI.

The study models further underscored the important role of functional change to clinical progression in MCI. The three models explained between 40–75% of the variance in clinical progression as defined by two year change scores on the DRS-2, MMSE, and CDR-SOB. As expected, *both* functional and neurocognitive variables were retained in the final models for each measure of progression. Interestingly, although different cognitive variables were retained in each of the resulting models, more uniformity was observed for functional variables, as illustrated by cash transactions and checkbook management being retained in at least two models. This finding highlights how decline in these two aspects of higher-order functional skill impacts and reflects progression in MCI. More generally, the models introduced in this study, show that higher-order functional skills contribute unique variance to measures commonly used to track progression in neurological disorders associated with aging.

In addition to demonstrating that changes in both cognitive abilities and higher-order functional skills appear integral to understanding clinical progression in MCI likely due to AD, we specifically identified financial capacity as an important functional marker of progression in our sample of patients with prodromal AD. Consistent with the results of a previous study[8], significant declines in checkbook management were observed. In addition, bank statement management declined significantly in the current study, despite only approaching significance in our previous study. This finding is not surprising given that the sample was observed for an additional year in the current study, and highlights the progressive nature of financial capacity declines in this sample of people with MCI. Moreover, investment decision making was also found to be significantly poorer for year two versus baseline in our sample. Although not statistically significant, the two year observation period had a small to medium effect on bill payment and a small effect on basic monetary skills and conceptual knowledge. Taken together, these results illustrate the progressive nature of financial capacity decline in this cohort of people with MCI likely due to AD.

Another interesting finding of our paper is that, in contrast to change over time on our functional measure, the cognitive measures demonstrated relatively little change over time.

In fact, significant decline over the two-year study period was only observed on a measure of episodic memory. Although not statistically significant, time exerted small effects on delayed episodic memory and immediate visual memory. As can be seen, all three of these variables are related to memory ability. This finding is not surprising given that the current sample was comprised of people with MCI likely due to AD and that people with impaired episodic memory are more likely to develop dementia than people with impairments in other cognitive domains[33]. Interestingly, these findings suggest that cognitive decline may progress independently in different cognitive domains in people with MCI, at least in the first two years. More germane to the focus of this study, these results seem to indicate that decline is occurring in a wider range of financial skills than for neurocognitive functioning in people with aMCI.

These findings have important diagnostic implications and implications for providers and patients. At present, diagnostic criteria related to everyday functioning in MCI are constructed in a manner that assumes delineation between virtually intact functional abilities for MCI and impaired functional abilities for dementia[19,34]. However, a wide range of medical and psychiatric conditions are reliably associated with cognitive changes *and* changes in everyday functioning[17,35,36]. Thus, consistent with the findings of this study, the cognitive impairments characteristic of MCI should impact aspects of higher-order functional skill. Although more recent diagnostic criteria constructed specifically for MCI due to AD have acknowledged that mild problems performing complex functional tasks are common in MCI, it is also acknowledged that determining level of functional change is difficult[34]. Our results demonstrate, however, that performance-based measures of financial skills (i.e., FCI) may lessen this challenge by offering the ability to track an aspect of higher-order functional change as people progress from MCI to AD. In regards to providers and patients, our results show that clinicians should monitor the financial ability of patients with MCI as this appears to be an important functional marker of progression in the condition. In particular, clinicians should inquire with patients and their families about changes in ability to use a checkbook.

There were several study limitations and associated directions for future research. First, although the number of participants with MCI in the current study was similar to or larger than other studies of financial skills in MCI[8,25], the sample size was somewhat limited. Thus, these findings may not generalize to the MCI population as a whole. Second, the present study was limited to two years of longitudinal data. Longer periods of observation are needed to better understand how well financial capacity and other complex functional skills predict progression in MCI. Third, our sample was comprised of people diagnosed with MCI likely due to AD. Thus, these findings may not generalize to persons with MCI due to other etiologies. Future studies should examine the utility of the models in different samples of people with MCI. Fourth, consensus conference team members were not blind to baseline progression measure scores when making diagnostic impressions. Although this limitation was mitigated to some degree through statistical means (i.e., holding baseline scores on progression measures constant for regression modeling), if possible clinicians making diagnostic impressions might be blinded to baseline progression measure scores in future studies. Fifth, studies might compare the predictive value of subjective versus

performance-based functional measures in predicting progression in MCI. Finally, other higher-order functional abilities in addition to financial capacity should be examined in future studies. Despite these limitations, this study contributes to the existing empirical literature by demonstrating the interdependent relationship between complex functional skills, cognitive functioning, and clinical progression in persons with MCI.

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Table 1

Baseline and Year 2 Financial Capacity

Financial Capacity Domain	Baseline	Year 2	*t*	*df*	*p*	*d*
D1. Basic Monetary Skills	30.7 (3.7)	29.7 (5.6)	1.443	51	0.155	0.21
D2. Conceptual Knowledge	27.0 (5.0)	25.7 (6.4)	1.750	51	0.086	0.23
D3. Cash Transactions	20.0 (3.9)	19.3 (4.8)	1.376	51	0.175	0.16
D4. Checkbook Management	45.5 (5.8)	42.0 (9.1)	3.275	51	0.002	0.46
D5. Bank Statement Management	30.5 (6.8)	27.7 (9.4)	3.341	51	0.002	0.34
D6. Financial Judgment	13.7 (2.7)	13.5 (2.9)	0.339	51	0.736	0.07
D7. Bill Payment	39.8 (7.1)	36.8 (10.0)	2.431	51	0.019	0.35
D9. Investment Decision Making	12.7 (4.1)	11.1 (4.2)	2.839	51	0.007	0.39

Note. Values for Baseline and Year 2 are mean (SD). *p* value for *t*-test analyzing group differences. *df* = degrees of freedom. *d* = Cohen's *d*. D = Financial Capacity Inventory domain.

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Table 2

Clinical Progression and Cognitive Measures at Baseline and Year 2

Measure	Baseline	Year 2	*t*	*df*	*p*	*d*
Clinical Progression						
DRS-2 Total	130.9 (7.3)	124.8 (14.6)	3.5	50	0.001	0.5
MMSE	27.6 (1.9)	25.9 (4.2)	3.0	50	0.004	0.5
CDR-SOB	1.7 (0.8)	3.3 (2.3)	5.5	50	<0.001	0.9
Attention						
Digit Span	13.1 (3.3)	12.7 (3.7)	0.852	41	0.399	0.11
DRS-2 Attention	35.3 (1.6)	35.0 (2.2)	0.902	50	0.371	0.16
Expressive Language						
Animal Naming	15.8 (3.9)	15.1 (5.2)	1.196	50	0.237	0.15
Verbal Memory						
CVLT-II Total	29.6 (7.5)	27.1 (7.6)	2.697	49	0.010	0.33
CVLT-II Long Delay	2.9 (2.7)	2.2 (2.7)	2.037	49	0.047	0.26
Visual Memory						
Visual Reproduction I	58.3 (15.7)	54.2 (19.6)	1.930	48	0.060	0.23
Visual Reproduction II	19.5 (18.7)	18.7 (20.7)	0.293	48	0.771	0.04
Executive Function						
Trails B	130.5 (70.3)	140.8 (82.0)	−1.075	49	0.287	0.13
Processing Speed						
Trails A	42.6 (22.7)	47.2 (33.4)	−1.002	50	0.321	0.16

Note. Values for Baseline and Year 2 are mean (SD). *p* value for *t*-test analyzing group differences. *df* = degrees of freedom. *d* = Cohen's *d*. CVLT-II = California Verbal Learning Test, DRS = Dementia Rating Scale, MMSE = mini mental state examination, CDR-SOB = clinical dementia rating sum of boxes.

Table 3

Results of the hierarchical regression used to predict DRS-2 decline

Step	F; df; *p*	R^2	SEE	β, SE
1	0.05; 40; =0.824	0.24	13.7	
DRS-2 Baseline				−0.07, 0.30
Constant				15.27, 38.83
2	32.9; 39; <0.001	0.62	8.4	
DRS-2 Baseline				−0.18, 0.18
Trails A				−0.30, 0.04
Constant				28.06, 23.86
3	33.1; 38; <0.001	0.71	7.3	
DRS-2 Baseline				−0.07, 0.16
Trails A				−0.23, 0.04
Cash Transactions				1.17, 0.32
Constant				12.87, 21.25
4	31.3; 37; <0.001	0.75	6.8	
DRS-2 Baseline				0.03, 0.15
Trails A				−0.15, 0.05
Cash Transactions				1.01, 0.30
Checkbook Management				0.54, 0.19
Constant				−1.41, 20.22

Note. DRS-2 Baseline was entered in first block of hierarchical regression. R^2 = adjusted R^2. SEE = standard error of the estimate of the regression model, β = unstandardized beta weights, SE = standard error of coefficient, DRS = Dementia Rating Scale.

Table 4

Results of the hierarchical regression used to predict MMSE decline

Step	F; df; *p*	R^2	SEE	β, SE
1	3.64; 48; =0.062	0.05	3.21	
MMSE Baseline				0.46, 0.24
Constant				−11.37, 6.70
2	13.30; 47; <0.001	0.33	2.69	
MMSE Baseline				0.48, 0.20
Checkbook Management				0.29, 0.06
Constant				−12.80, 5.61
3	13.15; 46; <0.001	0.43	2.49	
MMSE Baseline				0.50, 0.19
Checkbook Management				0.21, 0.06
Basic Monetary Skills				0.27, 0.09
Constant				−13.21, 5.21
4	12.30; 45; <0.001	0.48	2.38	
MMSE Baseline				0.53, 0.18
Checkbook Management				0.16, 0.06
Basic Monetary Skills				0.27, 0.09
CVLT-II Total				0.13, 0.06
Constant				−14.30, 4.98

Note. MMSE Baseline was entered in first block of hierarchical regression. R^2 = adjusted R^2. SEE = standard error of the estimate of the regression model, β = unstandardized beta weights, SE = standard error of coefficient, MMSE = Mini Mental Status Examination, CVLT-II = California Verbal Learning Test.

Table 5

Results of the hierarchical regression used to predict change on CDR Sum of Boxes

Step	F; df; *p*	R^2	SEE	β, SE
1	0.49; 47; =0.486	0.01	1.77	
CDR Baseline				−0.22, 0.31
Constant				−1.09, 0.57
2	6.09; 46; =0.005	0.18	1.60	
CDR Baseline				−0.23, 0.28
Animal Naming				−0.20, 0.06
Constant				−0.94, 0.52
3	9.64; 45; <0.001	0.35	1.42	
CDR Baseline				−0.12, 0.25
Animal Naming				−0.21, 0.05
VR I				−0.05, 0.01
Constant				−0.91, 0.46
4	9.10; 44; <0.001	0.40	1.36	
CDR Baseline				−0.21, 0.25
Animal Naming				−0.18, 0.05
VR I				−0.05, 0.13
Cash Transactions				−0.14, 0.06
Constant				−0.75, 0.45

Note. CDR Sum of Boxes Baseline was entered in first block of hierarchical regression. R^2 = adjusted R^2. SEE = standard error of the estimate of the regression model, β = unstandardized beta weights, SE = standard error of coefficient, CDR = Clinical Dementia Rating, VR = Visual Reproduction.