Characterization of Activities of Daily Living in Individuals With Mild Cognitive Impairment

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Abstract

Objective—To determine whether participants with mild cognitive impairment (MCI) differ from cognitively normal (NC) older adults on traditional and novel informant-based measures of activities of daily living (ADL) and to identify cognitive correlates of ADLs among participants with MCI.

Design—Cross-sectional.

Setting—University medical setting.

Participants—Seventy-seven participants (NC: N = 39; MCI: N = 38), 60 to 90 years old (73.5 ± 6.6 years; 53% female).

Measurements—Neuropsychological and ADL measures.

Methods—Neuropsychological tests were administered to NC and MCI participants. Informants completed the Lawton and Brody Instrumental Activities of Daily Living and Physical Self-Maintenance Scale, including instrumental (IADL) and basic ADL (BADL) scales, as well as the Functional Capacities for Activities of Daily Living (FC-ADL), an error-based ADL measure.

Results—No statistically or clinically significant between-group differences emerged for the BADL or IADL subscales. However, a robust difference was noted for the FC-ADL scale (MCI errors > NC errors; $F_{(1,75)} = 13.6$, $p < 0.001$; $d = 0.84$). Among MCI participants, correlations revealed that a measure of verbal learning was the only neuropsychological correlate of FC-ADL total score ($r = -0.39$, $df = 36$, $p = 0.007$). No neuropsychological measures were significantly associated with the IADL or BADL subscale score.

Conclusion—Traditional measures assessing global ADLs may not be sensitive to early functional changes related to MCI; however, error-based measures may capture the subtle evolving functional decline associated with MCI. Among MCI participants, early functional difficulties are associated with verbal learning performance, possibly secondary to the hallmark cognitive impairment associated with this cohort.

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Keywords

Instrumental activities of daily living; MCI; memory; functional errors; neuropsychology

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Mild cognitive impairment (MCI) is often a precursor to Alzheimer disease (AD) and other forms of dementia, as 12% of individuals with MCI convert to AD over 1 year,[1] and as many as 60% of individuals with MCI develop AD over a 5-year period.[2] According to current research diagnostic criteria, individuals with MCI exhibit cognitive impairment but largely preserved functional abilities (i.e., activities of daily living; ADLs) comparable to that of cognitively normal (NC) older adults.[3] In contrast, individuals with AD and dementia exhibit cognitive impairment in memory and at least one additional cognitive domain that directly contributes to functional impairment. Thus, functional integrity is a key differentiating feature separating individuals with MCI from patients with dementia.

However, recent research has suggested that some MCI participants may not have preserved functional abilities. For instance, MCI participants have significantly worse instrumental ADL (IADL) informant-based ratings when compared with their cognitively unimpaired peers,[4,5] and those with self-reported IADL impairment experience more rapid functional decline[6] and are more likely to convert to dementia[7] compared with those MCI participants without reported IADL problems. Most prior studies examining functional skills in MCI have emphasized more traditional assessment of global functional activities with performance dichotomies or categorizations that may not be sensitive to early functional changes. One exception is work by Farias and colleagues[8] in which MCI participants were compared with NC participants on an informant-based rating scale sensitive to functional "problems." These MCI participants performed worse than their NC peers across several functional tasks sensitive to multiple cognitive domains, such as memory, planning, and language.[8]

Because functional skills deteriorate insidiously over time in patients with early-stage dementia, examination of functional errors (e.g., subtle problems performing functional tasks) may capture early difficulties that precipitate global functional difficulties or dependence characteristics of dementia. Quantifying such error behaviors may provide more sensitive information about early functional changes rather than global ratings of behaviors via a traditional informant-based functional questionnaire. Although limited, most prior research quantifying functional errors has used performance-based assessment tasks.[9–11] These studies have yielded important information about the nature of functional impairment through the quantification of error patterns in numerous neurological populations, including closed head injury,[12] stroke,[13] and dementia.[9] However, performance-based functional measures are sometimes time consuming and difficult to implement in a clinical setting.[14]

Informant-based error measures may serve as a valuable alternative to assessing early functional changes. As an example, Glosser and colleagues developed the Functional Capacities of Activities of Daily Living (FC-ADL) scale, an informant-based measure that quantifies functional errors.[15] The FCADL consists of 50 statements reflecting errors associated with every day activities. This measure provides a quick assessment of functional difficulties without relying on functional dependence as an out-come, which may have particular clinical utility for individuals in the preclinical stages of dementia. For instance, difficulties with meal preparation, a traditional IADL, may be related to a number of functional errors, some of which are captured by the FC-ADL (e.g., "forgets and leaves things on the stove" and "cannot concentrate on more than one thing"). To date, the FC-ADL has not been applied in an MCI cohort.

Knowledge of the predictors of functional decline associated with MCI would aid clinicians in making determinations regarding these individuals' functional independence and disease course. Such predictions would be extremely useful for those patients without direct care providers. Although functional impairment has been documented in persons with MCI, few studies have examined the cognitive correlates of functional abilities in persons with MCI. Farias et al.,[16] reported relations between verbal memory and functional abilities in a heterogeneous sample of older adults with cognitive status ranging from normal to dementia. Similarly, Tuokko and colleagues[17] found that memory and processing speed measures were most consistently related to functional abilities among NC and MCI participants. Studies of persons with dementia suggest that executive functioning and memory are the most salient cognitive correlates of functional abilities.[18–20] Therefore, based on prior findings, it seems plausible that memory and executive functioning would be key cognitive correlates of functional skills among participants with MCI.

Research suggests persons with MCI have functional impairment; however, limited research has examined the best way to identify ADL impairments and their cognitive correlates. A closer examination of functional skills in individuals with MCI may enhance our understanding of the natural history and cognitive correlates of functional deterioration associated with dementia. Thus, this study had two goals. First, we compared informant-based functional ratings of MCI and NC participants to determine if the MCI participants were impaired relative to the NC group (i.e., ≥ 1.5 standard deviations). We hypothesized that a novel, error-based measure (i.e., FC-ADL[15]) would be more sensitive to early functional changes in MCI than a traditional measure assessing global functional dependence (i.e., Instrumental Activities of Daily Living and Physical Self-Maintenance Scale; IADL-PSMS[21]). Second, we characterized the neuropsychological correlates of functional abilities in participants with MCI, with particular emphasis on executive functioning and memory abilities because prior research has emphasized these behaviors as most important to ADLs among AD,[22] MCI,[16,17,23] and NC[24,25] participants.

METHODS

Participants

Participants were English-speaking, community dwelling individuals aged 60–90 years, who were prospectively recruited through the Boston University Alzheimer's Disease Core Center patient and control research registry, affiliated neurologists, advertisements, and community outreach programs to participate in this prospective study. Exclusion criteria included a history of major psychiatric illness requiring hospitalization (e.g., schizophrenia, bipolar disorder), neurological illness other than MCI (e.g., stroke, epilepsy, dementia), head injury with significant loss of consciousness, or lack of a reliable informant. Consensus diagnoses were made by a multidisciplinary team based on neurological and neuropsychological results of the participant's most recent annual registry visit. Participants included 38 individuals with MCI, diagnosed according to widely accepted research criteria,[3,26] and 39 NC participants free of cognitive impairment. NC participants did not have any self-or informant-based complaint of memory or cognitive difficulties and performed in the normal range on their neuropsychological assessment at their annual registry evaluation. The determination of preserved functional status for the MCI diagnosis was based on information gathered from the clinical interview and history rather than informant-based functional questionnaire responses. Among the 38 MCI participants, 18 (47%) were characterized as single domain amnestic, 13 (34%) as multiple domain amnestic, 2 (5%) as single domain nonamnestic, and 5 (13%) as multiple domain nonamnestic.

Neuropsychological Evaluation

Participants prospectively completed a neuropsychological protocol of sufficient length to assess multiple cognitive components but brief enough to increase participant compliance. Measures included in the protocol have strong reliability and validity and are sensitive to cognitive functions mediated by both frontal-subcortical and cortical systems.[27,28] The tests were carefully selected so that a range of global cognition, learning and memory, and executive functioning performances may be documented, precluding floor or ceiling effects (Table 1 for a summary of measures). In addition to multiple cognitive measures, mood was assessed using the 30-item Geriatric Depression Scale (GDS34).

Functional Measures

IADL-PSMS[21] is a functional measure in which primary caregivers are asked to judge participants' performance of basic ADLs (BADLs) (i.e., feeding, dressing, grooming, bathing, toileting, ambulating) and more complex IADLs that facilitate independence (i.e., traveling, management of finances, telephone use, meal preparation, housekeeping, laundry, shopping, medication maintenance). The IADL-PSMS version implemented in the present study deviates from the original by allowing for performance gradations across each item, including completely dependent, requiring assistance, and completely independent. Summary scores were calculated based on basic self-care functions (i.e., BADL subscale, 6 items, range: 0–12), instrumental activities (i.e., IADL subscale, 8 items, range: 0–16), and a combination of both reflecting global functional status (ADL total, range: 0–28). Higher scores indicated more intact functional abilities. In those cases where a particular item did not apply to a participant, a prorated score was calculated to exclude impertinent items, while preserving the overall estimate of functional status.[35]

FC-ADL[15] is a 50-item questionnaire based upon standard ADLs and common functional problems for individuals with cognitive decline. Questions focus on specific behaviors, such as visual (e.g., "Misjudges distances when reaching for things"), habitual (e.g., "Does not use tools for the proposed use"), and recognition processes (e.g., "Gets lost in familiar places"). Informants are asked to judge participants' abilities to each functional item on a Likert scale, ranging from "not at all" to "very much." Total scores range 50 to 250, and higher scores indicate greater functional difficulty.

Procedure

The local Institutional Review Boards approved the proposed protocol. Participant study visits were held at the Boston University Medical Campus General Clinical and Research Center, the Edith Nourse Rogers Memorial Veteran's Administration Medical Center, or participants' homes. Participants and their informants provided written informed consent prior to initiating testing procedures. The neuropsychological assessment protocol was conducted in a single 2-hour session. During this time, informants completed the IADL-PSMS and FC-ADL measures.

Data Analysis Plan

Prior to hypothesis testing, between-group comparisons were conducted for demographic variables (i.e., age, education, sex, race), mood (i.e., GDS), and global cognitive functioning (i.e., Mini-Mental State Examination [MMSE]).[36] To test the primary hypothesis that MCI and NC participants differ on a qualitative measure sensitive to functional errors but not on a traditional measure assessing functional dependence, an analysis of variance was conducted for the FC-ADL total score, IADL subscale, and BADL subscale. Effect sizes were calculated according to Co-hen's *d* formula and interpreted according to published guidelines.[37]

The neuropsychological protocol is described in Table 1. We used Pearson correlations to test the association between the neuropsychological variables, the GDS, and the functional measures of interest.

As a secondary analysis, we sought to determine the early functional changes associated with MCI by comparing the NC and MCI groups on each FC-ADL item using Mann-Whitney tests. Significance was set a priori at $\alpha = 0.01$ for both primary and secondary analyses.

RESULTS

Demographic and Clinical Characteristics

The NC and MCI participants did not significantly differ on most demographic or clinical characteristics (Table 2), including age ($F_{(1,75)} = 2.2$, p = 0.14), education ($F_{(1,75)} = 0.6$, p = 0.45), sex ($\chi^2 = 1.0$, p = 0.31), and race ($\chi^2 = 0.1$, p = 0.96). As expected, the groups did significantly differ for MMSE total score ($F_{(1,75)} = 18.0$, p <0.001), such that the MCI participants' mean score (28.0 ± 1.7) was significantly lower than that of the NC participants (29.3 ± 0.9). This pattern of performance was similarly observed for most neuropsychological measures included in the protocol (Table 1). The groups also differed on the GDS, a measure of depressed mood, and this difference approached statistical significance ($F_{(1,75)} = 4.7$, p = 0.03); however, a post-hoc analysis of covariance revealed that the GDS difference was attenuated when global cognitive status, as assessed by the MMSE, was simultaneously considered ($F_{(1,74)} = 2.1$, p = 0.15).

MCI and NC Functional Comparisons

Consistent with our hypothesis, the MCI participants' scores were significantly worse than the NC participants' on the FC-ADL questionnaire ($F_{(1,75)} = 13.6$, p = 0.0004, $d = 0.84$, 95% confidence interval: 0.36–1.29). In fact, the MCI participants' mean FC-ADL score was more than 1.5 standard deviations worse than the mean score for the NC participants. A difference that did not reach the a priori significance level was observed between groups for the IADL subscale ($F_{(1,75)} = 4.9$, p = 0.03), such that the MCI participants had worse ratings when compared with the NC participants. Inspection of the means and standard deviations for the two groups suggests this difference is not clinically meaningful. As expected, no between-group difference was observed for the BADL subscale ($F_{(1,75)} = 1.3$, p = 0.26). Post-hoc analyses suggest that inclusion of the GDS as a covariate does not attenuate the findings for the FC-ADL ($F_{(1,74)} = 12.8$, p = 0.001), IADL subscale ($F_{(1,74)} = 4.4$, p = 0.03), or the BADL subscale ($F_{(1,74)} = 1.4$, p = 0.23). See Table 3 for means and standard deviations for the functional measures.

Neuropsychological Performances in Relation to Functional Measures

Correlational analyses revealed that the FC-ADL was significantly associated with only one neuropsychological measure, the CVLT-II Trial 1–5 (r =-0.39, p = 0.008). The IADL subscale was correlated with several measures, including a measure of executive function, Judgment (r = 0.35, p = 0.02), and two indices of memory (i.e., CVLT Trial 1–5, r = 0.34, p = 0.02; CVLT Long Delay Free Recall, r = 0.28, p = 0.04). However, these associations did not reach statistical significance. There were no statistically significant correlations between any neuropsychological measure and the BADL subscale. See Table 4 for all correlation results.

Functional Competencies Item Analysis

As a secondary analysis, nonparametric between-group comparisons across all FC-ADL items yielded significant differences for four items that were related to memory, perseveration, and

fatigue. Table 5 lists items for which individuals with MCI performed more poorly than NC participants.

CONCLUSION

Our findings suggest that persons with MCI do have clinically significant functional impairments, particularly on an informant-based measure that quantifies error behaviors, and these functional difficulties are associated with verbal learning performance. Given that MCI participants with early functional changes experience more rapid functional decline[6] and convert to dementia faster[7] than their functionally intact MCI peers, identifying MCI participants with early functional changes is clinically important. Our results suggest that the development and implementation of more sensitive functional assessments can assist with earlier detection. These findings and their implications are discussed in more detail below.

Participants with MCI differed from NC participants on an error-based functional measure, such that the MCI participants performed more than 1.5 standard deviations worse on the FC-ADL than the NC participants. In contrast, a between-group difference that did not reach statistical significance was observed using a traditional measure of IADLs, though this difference appears clinically negligible. As expected, no difference was observed using a traditional measure of BADLs. These findings suggest that MCI participants may not differ from NC participants on global informant-based ratings of ADLs that focus on functional dependence; however, quantitative assessment of functional errors may yield subtle early functional changes that are clinically meaningful.

Our findings are consistent with prior findings documenting poorer informant-rated functional status in individuals with preclinical dementia and MCI compared with their NC peers.[8,17] The effect size generated in the present study for the FC-ADL between-group difference (i.e., $d = 0.84$) appears larger than some effect sizes previously reported for other functional measures.[8] Our findings extend the extant functional literature by suggesting that traditional and novel functional rating measures differ in their detection of early ADL changes associated with preclinical dementia. Moreover, our data emphasize that functional impairment among individuals with MCI is subtle, which in turn suggests that functional measures to evaluate functional status or the trajectory of functional decline among individuals with MCI need to be more qualitative in nature. This approach is in contrast to evaluating functional trajectory in dementia, where global measures assessing IADL and BADL dependence are appropriate and sensitive to changes.[18,38]

Although we hypothesized that executive function and memory measures would both predict functional abilities in persons with MCI, our findings were mixed. Only a serial list learning variable significantly correlated with the FC-ADL total score at the a priori significance level. However, for the IADL subscale score, correlations that approached statistical significance included an executive functioning measure of judgment and a delayed recall memory measure. Both of these findings are supported by prior cognitive-ADL research, such that past studies have related memory[16,17] and elements of executive functioning[17,23] to functional ratings of MCI participants. Furthermore, neuroimaging data support frontal lobe[39] and hippocampal changes[40] in MCI, which likely mediate, in part, the cognitive difficulties underlying these early functional changes.

The finding that two measures of functional skills were sensitive to disparate cognitive functions in the same sample of MCI participants suggests that informant-based functional measures may be differentially sensitive to cognitive functions. This finding could account for variation in cognitive-ADL relations in the literature.[18,19] Additional research is warranted to better understand how functional measures are differentially sensitive to cognitive

functioning and how these inconsistencies play out in various diagnostic groups (e.g., Alzheimer disease versus vascular dementia patients) and samples with cognitive severity differences (e.g., NC participants versus dementia patients).

Our between-group item analysis of the FC-ADL yielded several significant differences on items assessing memory, perseveration, and fatigue, though the clinical significance of these differences may be marginal. Of the few differences noted, half of these were memory in nature, which corresponds to the correlational findings that linked a serial list learning variable to FC-ADL performance. The majority of our MCI participants (i.e., 82%) were categorized as either single or multiple domain amnestic MCI. In light of the correlation between the FC-ADL scale and verbal learning, the FC-ADL item analysis findings are likely related to the hallmark memory impairment associated with the MCI research diagnostic criteria[3,26] and the preponderance of amnestic MCI participants in our sample. An item analysis on the FC-ADL is warranted between NC and MCI participants with more nonamnestic cognitive profiles.

The current study has a number of strengths including the well-characterized MCI sample with clinical status based on comprehensive work-up and multidisciplinary consensus diagnosis. Our implementation of a sensitive, error-based measure of functional status (FC-ADL) in conjunction with a more traditional, global measure sheds light on discrepancies among prior cognitive-ADL research findings. Finally, the robust NC and MCI between-group difference on the FC-ADL measure supports the inclusion of more sensitive functional measures in the clinical evaluation of MCI and preclinical dementia.

Despite these strengths, there are limitations to the current study that restrict the generalizability of our findings. In particular, our cohort was, on average, college-educated and predominantly white of European ancestry. The sample sizes of the two groups may not have been sufficiently large to detect smaller effects on the more traditional ADL measure, the ADL/neuropsychological correlations, or the between-group FC-ADL item analysis. Although our study employed a rigorous selection process to ensure that participants with MCI were classified according to current research diagnostic criteria, known issues with MCI as a construct apply to our study (e.g., instability of classification over time). Longitudinal follow-up of the current cohort will elucidate relations between MCI status at baseline and long-term clinical outcome with specific emphasis on conversion to dementia. Additional future research directions include a more detailed investigation of functional status by MCI subtype (e.g., amnestic versus nonamnestic MCI, single versus multiple domain) and longitudinal tracking of cognitive and functional changes over time. Qualitative investigation of the specific functional abilities that decline earliest or most rapidly with aging and dementia would also extend the current literature.

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TABLE 1

Neuropsychological Performances for NC and MCI Participants

Domain	Neuropsychological Test	Test Description	NC	MCI	F[a]	p
Learning and Memory	California Verbal Learning Test-II (CVLT-II) Trial 1–5[29]	Assesses verbal learning; variable of interest is total words immediately recalled across five learning trials	52.0 ± 9.4 (32–71)	33.2 ± 10.9 (16–67)	65.5	<0.001
	CVLT-II Long Delay Free Recall[29]	Assesses retrieval abilities after a 20-minute delay; variable of interest is total words recalled	11.7 ± 2.7 (6–16)	5.7 ± 3.4 (0–14)	76.2	<0.001
	CVLT Recognition[29]	Assesses delayed recognition; dependent variable is recognition discriminability based on hits and false positive responses	3.2 ± 0.6 (1.8–4.0)	1.9 ± 0.8 (0.2–3.7)	59.3	<0.001
Executive Functioning and Information Processing	Judgment[30]	Measures judgment pertaining to home safety, health, and medication issues; dependent variable is total items correct	17.5 ± 1.6 (14–20)	17.1 ± 2.0 (12–20)	1.1	0.30
	Trail Making Test Number Sequencing (TMT-A31)	Measures visual-scanning and attention abilities; dependent variable is time to completion measured in seconds; higher scores indicate worse performance	41.3 ± 13.9 (21–86)	52.1 ± 32.5 (24–208)	3.6	0.06
	Trail Making Test Number-Letter Sequencing (TMT-B31)	Assesses sequencing and mental flexibility; dependent variable is time to completion measured in seconds; higher scores indicate worse performance	84.5 ± 26.8 (39–153)	164.3 ± 92.3 (75–551)	26.7	<0.001
	Matrix Reasoning[32]	Measures nonverbal abstract reasoning skills; dependent variable is total items correct	17.0 ± 4.2 (8–24)	11.8 ± 5.3 (4–23)	22.6	<0.001
	Similarities[32]	Measures verbal reasoning and abstraction; dependent variable is total items correct	28.2 ± 3.0 (19–33)	23.2 ± 6.1 (0–30)	20.9	<0.001
	Controlled Oral Word Association (COWA33)	Assesses rapid word generation; dependent variable is total words generated across each of three letters (i.e., F, A, S)	50.8 ± 10.9 (28–71)	36.3 ± 11.1 (10–57)	33.3	<0.001

Notes: Lower scores indicate worse performance except where specifically noted; data presented as mean standard deviation (range). NC: cognitively normal; MCI: mild cognitive impairment.

[a]Degrees of freedom 1, 75

TABLE 2

Demographic and Clinical Characteristics

Variable	NC (n = 39)	MCI (n = 38)	F or χ^2	df	p
Age, yrs	72.4±5.5 (60–82)	74.6±7.5 (60–90)	2.2	1, 75	0.14
Education Level, yr	16.4±2.5 (12–21)	15.9±2.9 (12–21)	0.6	1, 75	0.45
MMSE	29.3±0.9 (27–30)	28.0±1.7 (22–30)	18.0	1, 75	0.0001
GDS	2.79±3.5 (0–19)	4.79±4.5 (0–18)	4.7	1, 75	0.03[a]
Sex, % female	59	50	1.0	1	0.31
Race, % white	85	82	0.1	1	0.96

Notes: Data presented as mean ± standard deviation (range) or percentage (%). NC: cognitively normal; MCI: mild cognitive impairment; MMSE: Mini-Mental State Examination; GDS, Geriatric Depression Scale.

[a] Post-hoc analyses revealed that the between-group GDS difference may be associated with global cognitive status, as adjusting for MMSE score attenuates the finding ($F_{(1,74)} = 2.1$, p = 0.15).

TABLE 3

Functional Performances for NC and MCI Participants

Variable	NC (n = 39)	MCI (n = 38)	F	df	p	Effect Size[a]
IADL subscale	15.7±0.9	15.1±1.3	4.9	1, 75	0.03[b]	0.50
BADL subscale	12.0±0.2	11.8±0.8	1.3	1, 75	0.26[b]	0.26
FC-ADL total score	52.9±3.2	58.3±8.6	13.6	1, 75	0.0004[b]	0.84

Note: Data are presented as mean ± standard deviation. NC: cognitively normal; MCI: mild cognitive impairment; IADL: instrumental activities of daily living; BADL: basic activities of daily living; FC-ADL: Functional Capacities of Activities of Daily Living for which a higher score indicates worse performance.

[a] Cohen's d

[b] post-hoc ANCOVAs, adjusting for GDS total score did not attenuate the findings for the FC-ADL ($F_{(1,74)} = 12.8$, p = 0.001), IDAL subscale ($F_{(1,74)} = 4.4$, p = 0.03), or the BADL subscale ($F_{(1,74)} = 1.4$, p = 0.23).

TABLE 4

Correlations for Neuropsychological and Functional Measures Among MCI Participants

	FC-ADL Total Score	IADL Subscale	BADL Subscale
GDS	0.01	0.02	0.10
MMSE	0.02	0.16	0.07
CVLT-II Trial 1–5 Total Recall	0.39[a]	0.34	0.18
CVLT-II Long Delay Free Recall	0.20	0.28	0.01
CVLT-II Recognition	0.20	0.15	0.01
Judgment	0.15	0.35	0.25
TMT-A	0.01	0.10	0.10
TMT-B	0.20	0.24	0.09
Matrix Reasoning	0.07	0.12	0.02
Similarities	0.04	0.18	0.12
COWA	0.02	0.15	0.18

Notes: FC-ADL: Functional Capacities of Activities of Daily Living; IADL: instrumental activities of daily living; BADL: basic activities of daily living; correlational data is based on n = 38 (*df* = 36).

[a] p 0.01.

TABLE 5

Select Differences Between MCI and NC Participants on FC-ADL Items

FC-ADL Item	Mann-Whitney U	NC (n = 39)	MCI (n = 38)	p
Seems disoriented or confused	641.5	1.03±0.16	1.26±0.69	0.04
Misplaces objects	546.0	1.33±0.48	1.71±0.77	0.02
Does not keep self busy doing useful things	643.0	1.03±0.16	1.16±0.37	0.045
Becomes tired for no apparent reason	494.5	1.13±0.34	1.61±0.82	0.001
Does or says the same thing over and over again	546.0	1.00±0.00	1.39±0.86	0.001
Avoids certain social situations	623.0	1.05±0.22	1.21±0.41	0.04
Is irritable and easily upset	600.5	1.18±0.56	1.47±0.86	0.048
Has trouble recalling familiar phone numbers	567.0	1.08±0.35	1.37±0.63	0.006
Forgets details of recent events	529.5	1.08±0.35	1.42±0.68	0.002
Has poor memory for events from the past	579.0	1.10±0.31	1.39±0.68	0.02

Notes: Those items that had p 0.05 are presented to show statistically significant differences as well as those differences that approached statistical significance; data presented as mean ± standard deviation; p values calculated using Mann-Whitney Tests. NC: cognitively normal; MCI: mild cognitive impairment.