

Cognitive & Behavioral Assessment

# Relationship between the Activities of Daily Living Questionnaire and the Montreal Cognitive Assessment

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## Abstract

**Introduction:** The Activities of Daily Living Questionnaire (ADL-Q) is an informant report questionnaire assessing functional impairment in daily living skills. Previous research has demonstrated correlations between ADL-Q and cognitive screening measures among patients with dementia. This study examined the relationship between ADL-Q and the Montreal Cognitive Assessment (MoCA), a brief cognitive screening.

**Methods:** Records of 448 individuals from an outpatient neurology clinic were reviewed. Pearson correlations were calculated between ADL-Q scores and MoCA scores. Linear regression models were fit using demographic information to predict ADL-Q scores. MoCA scores were then added to the models to determine the increase in predictive value of the MoCA.

**Results:** Lower MoCA scores were associated with higher levels of functional impairment. For each model, adding the MoCA significantly improved model fit.

**Discussion:** Low scores on the MoCA, among patient's presenting for memory complaints, should raise concerns about functional decline and prompt for further assessment of functional ability.

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## Keywords:

Activities of daily living questionnaire; Montreal cognitive assessment; Cognitive screening; Activities of daily living

## 1. Introduction

Impairments in basic and instrumental activities of daily living (ADL) are often associated with cognitive decline in elderly populations. Measuring an individual's functioning in ADLs is an important aspect of assessment for neurodegenerative disease and is necessary in making accurate diagnoses, evaluating the severity of disease, monitoring disease progression over time, and ensuring appropriate levels of support are in place. Clinicians often use brief cognitive screening tests (e.g., Montreal Cognitive Assessment, Mini-Mental Status Examination) and measures of ADLs as part of routine dementia evaluations, and understanding how such measures are related is important to

establish how performance on cognitive screening may be predictive of functional independence and establish the need for further testing.

Research comparing performance on brief cognitive screening tests and measures of ADLs has demonstrated that individuals with greater cognitive impairment are more likely to have functional impairments in ADLs (e.g., [1,2]). In the dementia process, ADLs are typically lost in a hierarchical manner, with instrumental ADLs being impacted before basic ADLs [3,4]. Although performing ADLs involves multiple cognitive processes, research suggests that levels of executive functioning may be particularly important in predicting levels of functional impairment [5].

Given variable levels of insight among individuals with neurodegenerative disease, assessment of functional independence often uses collateral reports. One example

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designed to assess independence in both basic and instrumental ADLs is the Activities of Daily Living Questionnaire (ADL-Q [6]), which provides an overall indication of functional independence, as well as, more specific assessment of targeted domains (e.g., self-care, household care, employment and recreation, shopping and money, travel, and communication). Johnson et al. [6] examined its relationship with the mini-mental state examination (MMSE [7]) and the Clinical Dementia Rating Scale [8] and showed that individuals with lower scores on the cognitive screening measures had greater levels of functional impairment in ADLs.

The Montreal Cognitive Assessment (MoCA [9]) has been increasingly adopted as a cognitive screening tool given its increased sensitivity over other cognitive screening tools and its inclusion of cognitive domains not assessed by other screening measures (e.g., executive functioning) [10–12]. Given that the MoCA is a new measure that has not been included in most research associating functional impairment with cognition, it is valuable to examine the MoCA's relationship to the ADL-Q to ensure a similar trend holds true. The inclusion of executive functioning on the MoCA may increase its sensitivity to functional decline. This study sought to ascertain the relationship between performance on the MoCA and informant reports of functional independence using the ADL-Q in a memory disordered population because both are freely available measures that could be readily used in clinical settings.

## 2. Method

### 2.1. Participants

Data were obtained from medical records of 448 consecutive patients seen by neuropsychology in an outpatient neurology center specializing in neurodegenerative disease. Patients with Parkinson's disease (PD) were excluded to limit the influence of motor impairments on functional status. All other patients referred for neuropsychological testing were included. The analyzed sample was 47.3% women and predominately Caucasian (91.5%) with an average age of 71.3 years ( $SD = 8.9$ ), an average of 14.5 years ( $SD = 2.8$ ) of education, and average estimated premorbid intelligence of 99.1 ( $SD = 13.9$ ). Working diagnostic considerations included Alzheimer Disease ( $n = 115$ ), mild cognitive impairment ( $n = 91$ ), cognitive disorder not otherwise specified ( $n = 72$ ), psychiatric illness including depression and anxiety (PSY,  $n = 18$ ), dementia with Lewy bodies ( $n = 17$ ), frontotemporal dementia ( $n = 12$ ), cognitively normal (Normal;  $n = 12$ ), vascular dementia ( $n = 6$ ), and other neurological conditions including hydrocephalus, primary progressive aphasia, post concussive syndrome, seizures, stroke, cognitive impairment due to an acute medical illness, and subjective memory complaints

(Other;  $n = 26$ ). Diagnostic information was unavailable for 79 individuals. The MoCA was completed during the initial visit with neurology, and subsequent neuropsychological assessment included a standard battery of cognitive measures. A family member or caregiver completed an inventory rating functional independence. This study was reviewed and approved by the Cleveland Clinic Institutional Review Board.

### 2.2. Measures

#### 2.2.1. Activities of Daily Living Questionnaire

The ADL-Q is an informant report questionnaire completed by a caregiver and is divided into six domains of functioning as follows: (1) self-care, (2) household care, (3) employment/recreation, (4) shopping/money, (5) travel, and (6) communication. Each domain contains three to six items rated using a 4-point scale, ranging from zero (no problem) to 3 (no longer capable). An option to indicate the individual never performed the activity in the past, stopped the activity before illness, or the rater does not have sufficient knowledge to rate functioning in that area is also available; if endorsed, this item is not counted. A total score representing overall functional impairment and subscale scores representing functional impairment in each of the six areas are calculated. Total scores ranging from 0%–33% indicate minimal impairment, 34%–66% moderate impairment, and  $\geq 67\%$  severe impairment.

#### 2.2.2. Montreal Cognitive Assessment

The MoCA is a brief cognitive screening measure that takes approximately 10 minutes to administer and can be administered by various levels of health care providers. The MoCA consists of 12 individual tasks grouped into cognitive domains including (1) visuospatial/executive functioning, (2) naming, (3) attention, (4) language, (5) abstraction, (6) memory, and (7) orientation. A total score is calculated, and an educational correction is made if applicable (i.e., one point added for individuals with 12 years of education or less). Validated clinical use of the MoCA is interpretation of the total score, with a total score of  $\leq 26$  indicating cognitive impairment.

### 2.3. Data analysis

Pearson correlation coefficients were calculated to determine the relationship between ADL-Q scores and MoCA total scores. Several linear regression models were first fit using age, gender, education, and estimated premorbid intelligence as predictors in a base model. Outcomes of interest included separate models for the ADL-Q total score, as well as, the individual ADL-Q domain scores, for a total of seven separate models. The MoCA total score was then added to each base model to determine the added predictive

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