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Normative Data of the Montreal Cognitive Assessment in the Greek Population and Parkinsonian Dementia

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Abstract

The Montreal Cognitive Assessment (MoCA) is a brief cognitive instrument for the measurement of dementia. The aim of the present study is to provide normative data for the MoCA test in the Greek speaking population and to measure its validity in a clinical group of parkinsonian dementia participants. A total of 710 healthy Greek speaking participants and 19 parkinsonian dementia participants took part in the study. Both, the MoCA test and a neuropsychological test battery (digit span, semantic verbal fluency, phonemic verbal fluency, Color Trails Test) were administered to the normative and clinical samples. The test was found to correlate with all neuropsychological tests used in the test battery and it showed high discriminant validity (optimal screening cutoff point = 21, sensitivity = 0.82, specificity = 0.90) in the parkinsonian dementia participants. Further research is needed to use it in larger clinical samples and in different neurological diseases.

Keywords: Assessment; Norms/normative studies; Movement disorders; Parkinson's disease; Dementia

Introduction

The aim of the present study was to provide normative data about the Montreal Cognitive Assessment (MoCA) in the Greek-speaking population, for participants aged 20 years or more, using it in a battery of neuropsychological tests and examining relationships of the test with age, gender, and education. Finally, the criterion validity of the test was examined in a group of Greek-speaking participants exhibiting parkinsonian dementia.

The MoCA test is a short in duration (10–15 min) 30-point screening test that measures a number of cognitive domains such as visuospatial abilities, executive function, short-term memory, attention/concentration, language, abstract thinking, and orientation. In the original study, the test was developed to assess groups of participants diagnosed with mild cognitive impairment and Alzheimer's disease when compared with healthy controls (Nasreddine et al., 2005).

Since its development in 2005, the English version of the MoCA test has been proven sensitive to screen cognitive impairment in a number of diseases including Alzheimer's disease and dementia (Lees et al., 2014; Velayudhan et al., 2014), cerebrovascular disease (Horstmann, Rizos, Rauch, Arden, & Veltkamp, 2014; Ihara, Okamoto, & Takahashi, 2013; Koski, 2013; Pendlebury, Mariz, Bull, Mehta, & Rothwell, 2012; Pendlebury et al., 2012), Parkinson's disease (Chou et al., 2010; Chou, Lenhart, Koeppe, & Bohnen 2014; Dalrymple-Alford et al., 2010; Kandian et al., 2014; Zadikoff et al., 2008), etc.

In the Greek language, there is a scarcity of clinical data to relate the MoCA test to the scores of Mini Mental State Examination (MMSE) (Fountoulakis, Tsolaki, Chantzi, & Kazis, 2000) in the majority of neurological/psychiatric disorders. Only one study was found to report statistically significant correlations between the two tests ($r = -.544$, $p = .001$) (Lyrakos, Ypofandi, & Tzanne, 2014). According to this study, the Greek MoCA was found to be more sensitive than the MMSE in samples of patients exhibiting moderate/severe impairment in dementia, psychiatric diseases, a vascular stroke, and in the organic psychosyndrome. The limited sample of patients was a major limitation in this study.

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In Parkinson's disease, there is an agreement among researchers that the MoCA is a very sensitive tool to show the neuropsychological abnormalities seen in participants with dementia (PDD) when compared with participants without dementia (PD) (Chou et al., 2010, 2014; Dalrymple-Alford et al., 2010; Kandian et al., 2014; Zadikoff et al., 2008). The test was also selected by a Task Force formed by the Parkinson Study Group as the most appropriate test for the identification of cognitive dysfunction in PD clinical trials (Chou et al., 2010). A recent review of brief cognitive tests for patients with suspected dementia included the level of evidence/quality in different clinical settings and the types of dementia. According to the study, the MoCA test consistently showed higher sensitivity and specificity in the dementia of Parkinson's disease (Velayudhan et al., 2014).

Regarding its most appropriate cutoff score, the cutoff score of $\leq$26 showed 93% sensitivity for the diagnosis of mild cognitive impairment in PD (Kandian et al., 2014) while the same score showed statistically significant differences in global cognition and executive function and a reduction in dorsal nucleus dopaminergic innervation in PD participants with/without dementia (Chou et al., 2014). Other studies (Dalrymple-Alford et al., 2010) by using the cutoff score of 21 found sensitivity of 81% and specificity of 95% in detecting dementia of PD while the test was more sensitive than the MMSE in the early cognitive impairment of Parkinson's disease (Zadikoff et al., 2008).

Although there are many clinical studies using the MoCA test, the normative studies are still limited. The test has been standardized in languages/populations such as Italian (Conti, Bonazzi, Laiacona, Masina, & Coralli, 2015; Santangelo et al., 2014), Portuguese (Freitas, Simões, Alves, & Santana, 2011), Irish (Kenny et al., 2013), Japanese (Narazaki et al., 2013), Hebrew (Oren et al., 2015), and American (Rosetti, Lacritz, Cullum, & Weiner, 2011). One study (Rosetti et al., 2011) criticized specific items of the test to be culturally biased. Even though the researchers did not specify which items could suffer from cultural bias, it would be logical to think that the parts of the MoCA that examine language may be prone to the cultural bias and/or ethnicity. No study exists at the moment to provide normative data of the test in the Greek language.

Moreover, all of the normative studies present obvious methodological differences in their inclusion criteria. For example, other authors used broader inclusion criteria (Rosetti et al., 2011) (proficiency/comprehension in the English language and ability for completion of the MoCA test), whereas other authors used narrower inclusion criteria (Freitas et al., 2011) (native Portuguese origin; absence of motor, visual, or auditory deficits; absence of neurological/psychiatric diseases; and no history of alcoholism or substance abuse). In our view, the normative studies that will include strict exclusion criteria and a fairly large sample of participants will exhibit more advantages rather than the normative studies that will include broad exclusion criteria. For example, the inclusion of cofounding variables such as cardiological and metabolic diseases may influence the results in the MoCA score in a normative sample. The limited number of such normative studies shows that there is a need for further studies in different languages to use the MoCA test (Kandian et al., 2014).

Influenced by the original study (Nasreddine et al., 2005), most of the normative studies screened populations above 50 or 60 years of age (Conti et al., 2015; Kenny et al., 2013; Narazaki et al., 2013; Oren et al., 2015). Only three studies (Freitas et al., 2011; Rosetti et al., 2011; Santangelo et al., 2014) included samples above 20 years of age. Finally, only two studies (Freitas et al., 2011; Oren et al., 2015) used the MoCA test as a part of a battery of other neuropsychological tests. So, there is an extra need for normative samples to include both younger and older ages and examine the relationship of the MoCA test to a number of different neuropsychological tests.

Differences in the mean cutoff MoCA scores (22–27) were found in the normative studies that screened populations above the age of 50 (Conti et al., 2015; Kenny et al., 2013; Narazaki et al., 2013; Oren et al., 2015). The general trend of the data shows that as the number of participants in these studies increases, the mean MoCA cutoff score decreases. So, one study that screened 1,977 participants aged 65 years or more reported a general MoCA cutoff score of 22 (Narazaki et al., 2013), whereas another study that screened 54 participants aged 60 years or more (Oren et al., 2015) reported a general MoCA cutoff score of 27. Among studies, few differences were found in the mean cutoff MoCA scores (24–25) in populations above the age of 20 (Freitas et al., 2011; Rosetti et al., 2011).

Statistically significant associations were found in all studies between older age and lower scoring in the MoCA test (Conti et al., 2015; Freitas et al., 2011; Kenny et al., 2013; Narazaki et al., 2013; Oren et al., 2015; Rosetti et al., 2011; Santangelo et al., 2014). Also, education was found to be strongly associated with a higher scoring in the MoCA test (Conti et al., 2015; Freitas et al., 2011; Kenny et al., 2013; Narazaki et al., 2013; Oren et al., 2015; Rosetti et al., 2011; Santangelo et al., 2014). In most of the studies, gender was not found to be associated with MoCA score (Conti et al., 2015; Freitas et al., 2011; Narazaki et al., 2013; Rosetti et al., 2011; Santangelo et al., 2014).

In conclusion, a new normative study would ideally use the test in samples over the age of 20, aiming to identify relationships of the MoCA with a number of neuropsychological tests and showing if age, gender, and education could predict the scores of the test. Finally, because there is a lack of normative data in the Greek language, a new study could examine this test in a Greek-speaking sample of participants exhibiting the aforementioned criteria.

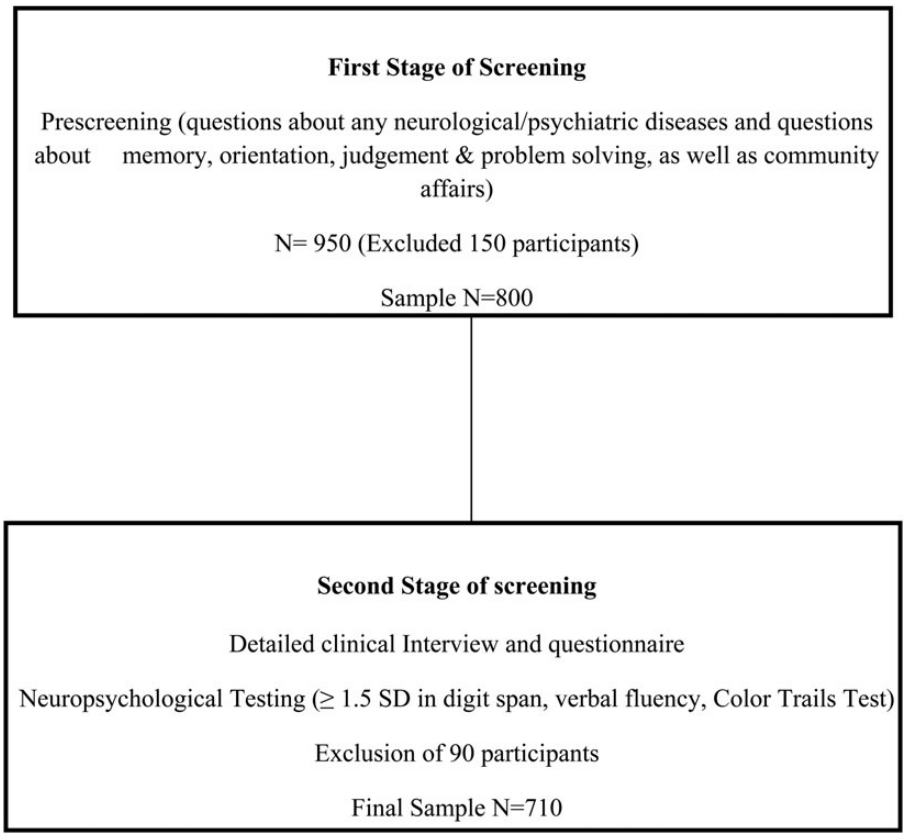
Methods

Participants

The final normative sample consisted of 710 community dwelling Caucasian Greek native speakers from 20 to 85 years old and recruited across a broad range of educational and occupational categories. The participants were volunteers from 6 major cities of Greece (Athens 233 participants, Iraklion 55 participants, Pyrgos 60 participants, and Kalamata 66 participants) and 2 major cities of Cyprus (Nicosia 225 participants and Larnaca 71 participants; sample of convenience). The sample included 328 men (46% of the total sample) and 382 women (54% of the total sample). Six hundred and seventy-nine participants (95% of the total sample) were right handed.

The screening of the Greek-speaking sample was taken in two stages. In the first stage, prescreening involved questions about any diagnosis of neurological/psychiatric diseases and questions about memory, orientation, judgement/problem solving as well as independent function in community affairs taken from the Clinical Dementia Rating scale (Hughes, Berg, Danziger, Cohen, & Martin, 1982). From the initial sample ($N = 950$), 150 participants were excluded due to a diagnosis of neurological/psychiatric diseases and suspicions of memory abnormalities.

The rest of the normative sample ($N = 800$) was entered in the second stage of screening that involved an interview with the participant and/or spouse (cases of older participants). Information in the interview included biographical information and thorough medical data such as the history of cardiovascular and metabolic diseases, the history of head trauma, and the history of alcohol or drug abuse. The participants were excluded from the study if they had been diagnosed with any other medical diagnosis (i.e., not medically controlled hypertension, atrial fibrillation, coronary heart disease, etc.) or medication that would affect neuropsychological function (i.e., antiepileptic medication). Further exclusions were taken place if the participants scored 1.5 *SD* below the normative values in at least one test of digit span, verbal fluency, and Color Trails Test (CTT). The criterion of 1.5 *SD* was used in studies of the literature in parkinsonian mild cognitive impairment to represent a "deficit" (Caviness et al., 2007; Hoops et al., 2009; Williams-Gray, Foltynie, Brayne, Robbins, & Barker, 2007) and in order for our normative sample to match our clinical sample as much as possible (will be described below). From the rest of the sample ($N = 800$), 90 participants did not fulfill one or more of the exclusion criteria and were excluded from the study. The majority of exclusions involved the existence of cardiovascular disorders and/or the 1.5 *SD* criterion in the aforementioned neuropsychological tests. The following flow chart shows the stages of screening in our normative sample.



Based on the potential contribution of age and education to the MoCA total score, the final normative sample was divided into six age groups (20–29, 30–39, 40–49, 50–59, 60–69 and 70–85 years), and three categories based on the Greek educational system (1–9 years, compulsory education; 10–12 years, high school education; and more than 13 years, higher education).

The Athens Naval Hospital's ethics committee approved the study protocol based on the principles outlined in the Declaration of Helsinki. All participants were informed about the aim and methods of the study and signed an informed consent form before entering the study.

The clinical sample in our study included 19 participants who were diagnosed with probable parkinsonian dementia before entering the study and seen regularly in the neurology clinic of the Navy Hospital of Athens. The neurological diagnosis of probable dementia was based on the Emre and colleagues' (2007) criteria with core features according to Queen Square Brain Bank criteria, impairment in more than one cognitive domains, and deficits severe enough to impair daily life. Associated clinical features included a profile of cognitive deficits with impairment in attention (Color Trails Test), executive function (verbal fluency), and short-term memory (digit span). So, probable PDD dementia was defined by the neurologists in the clinic, in the existence of core features, plus associated features (a profile of the cognitive deficit of three cognitive domains in attention, executive function, and working memory) as stated above. A criterion of ≥ 1.5 *SD* below the normative data was applied in the three neuropsychological tests measuring attention, executive function/language, and short-term memory. Similar studies in the literature of probable parkinsonian dementia have used the ≥ 1.5 *SD* criterion below the normative values in two cognitive areas to represent a deficit (Caviness et al., 2007; Hoops et al., 2009; Williams-Gray et al., 2007). The mean duration of the disease in the parkinsonian group was 6.1 years ($SD = 3.2$).

Materials and Procedure

The interview was taken by all participants (normative and clinical samples) and followed by the administration of the Greek version of the MoCA test, the digit span test of the WAIS-III (Wechsler, 1997a, 1997b), the verbal fluency test (Kosmidis, Vlahou, Panagiotaki, & Kiosseoglou, 2004), and the Color Trails Test (Konstantopoulos, Issidorides, & Spengos, 2013). The administration of the tests took place in the participants' homes except for the parkinsonian participants for whom it took place in the Navy Hospital of Athens.

Statistical Analysis

The Statistical Package for the Social Sciences (SPSS) version 20.0 was used for the analysis of data. Descriptive analysis involved means and standard deviations of all variables. Next, multiple regression analyses ("enter" method) were used to investigate the relationships of age, gender, and education (predictors) on MoCA score (outcome). A receiver operant characteristic with area under the curve (AUC; 95% confidence interval [95% CI]) was plotted for measuring the discriminant validity of detecting PDD. The AUC, sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were calculated. The lowest value of >80% sensitivity and NPV as well as the highest value for 80% specificity and PPV were used for the optimal cutoff score for MoCA.

Results

The mean age of the normative sample was 46.88 years ($SD = 16.56$), and the mean education was 13.76 years ($SD = 3.76$). The mean MoCA score of the normative sample was 27.20 ($SD = 1.85$). The mean score of the female subgroup was 27.34 ($SD = 1.83$) and the mean score for the male subgroup was 27.05 ($SD = 1.86$). Table 1 shows the mean normative data for each of the six age groups by age and education subcategories, and Fig. 1 shows the percentile scores for the MoCA test. Table 2 shows the mean normative scores across age groups and the subcategories of the MoCA test. Significant correlations were found between the total score of the MoCA test with all neuropsychological tests used (digit span: $r = .483$, $p = .000$; semantic verbal fluency: $r = .343$, $p = .000$; phonemic verbal fluency: $r = .421$, $p = .000$; CTT1: $r = -.317$, $p = .000$; CTT2: $r = -.376$, $p = .000$).

To investigate the predictive value of demographic variables (age, gender, and education) on the MoCA score, a multiple regression analysis model/simultaneous method ("enter" method in the SPSS) was used. A significant association of all variables with the total score of the MoCA test was found. So, 35.8% of the variation in the total score of MoCA was accounted for by age, gender, and education. Table 3 shows the results of the multiple regression analysis.

Table 4 shows the validity of the MoCA test for diagnosis of parkinsonian dementia. The AUC (95% CI) was 0.85 (0.74–0.97) for the MoCA when the healthy participants over 60 years old ($N = 174$) were used with the parkinsonian demented participants. The optimal screening cutoff point was found to be 21 (sensitivity = 0.82, specificity = 0.90).

Table 1. Montreal Cognitive Assessment (MoCA) score by age and education

Age group (years)	Education (years)					
	1–9		10–12		>13	
	No.	Mean (*SD*)	No.	Mean (*SD*)	No.	Mean (*SD*)
20–29			16	27.94 (1.52)	121	27.74 (1.56)
30–39			26	27.54 (2.16)	104	27.69 (1.46)
40–49	15	26.73 (1.87)	58	27.10 (1.94)	71	27.96 (1.99)
50–59	17	25.82 (1.88)	53	27.04 (1.59)	55	27.42 (1.72)
60–69	31	26.48 (1.67)	25	26.92 (1.80)	23	26.91 (1.88)
70–85	33	25.42 (2.05)	18	26.61 (1.88)	44	26.02 (1.42)

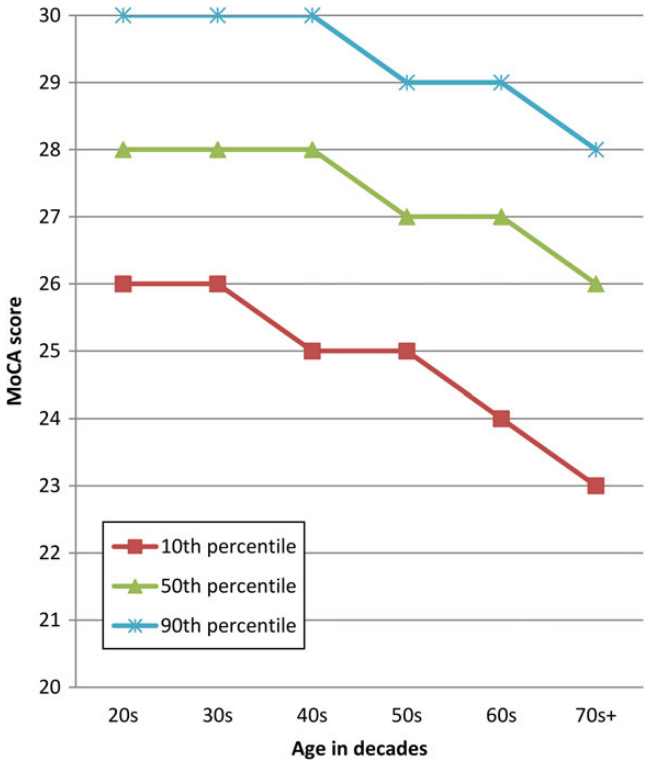


Fig. 1. Percentile scores for the MoCA test across age.

Discussion

The purpose of the present study was to provide normative data on the MoCA test in a sample of 710 Greek-speaking adults aged from 20 to 85 years old. The effect of age, gender, and education on the MoCA score was also taken into account. Finally, the criterion validity of the test was measured by comparing a group of demented parkinsonian patients with the total sample in our study.

Results showed that all variables (age, gender, and education) are essential variables to interpret the scores for the MoCA score. In age and education, older participants received a lower score in the MoCA test when compared with younger participants, whereas more educated participants exhibited higher scoring in the test when compared with less educated participants. The results of the present study are in agreement with the results of similar normative studies (Conti et al., 2015; Freitas et al., 2011; Kenny et al., 2013; Narazaki et al., 2013; Oren et al., 2015; Rosetti et al., 2011; Santangelo et al., 2014) which reported that age and education are important factors for the interpretation of the MoCA scores. A descriptive observation of the means in Table 1 shows that in most of the age categories, the participants who had 1–9 years education exhibited 0.5–1.5 points, lower scoring in the MoCA test when compared with participants who had 12+ years of education. In our study, the mean

Table 2. Means and standard deviations (in parentheses) for all MoCA variables by age and education

	Age 20–29 years		Age 30–39 years		Age 40–49 years			Age 50–59 years			Age 60–69 years			Age 70 + years		
Education (years)	10–12 ($n = 16$)	>13 ($n = 121$)	10–12 ($n = 26$)	>13 ($n = 104$)	1–9 ($n = 15$)	10–12 ($n = 58$)	>13 ($n = 71$)	1–9 ($n = 17$)	10–12 ($n = 53$)	>13 ($n = 55$)	1–9 ($n = 31$)	10–12 ($n = 25$)	>13 ($n = 23$)	1–9 ($n = 33$)	10–12 ($n = 18$)	>13 ($n = 44$)
MoCA	27.94 (1.52)	27.74 (1.56)	27.54 (2.16)	27.69 (1.46)	26.73 (1.87)	27.10 (1.94)	27.96 (1.99)	25.82 (1.88)	27.04 (1.59)	27.42 (1.72)	26.48 (1.67)	26.92 (1.80)	26.91 (1.88)	25.42 (2.05)	26.61 (1.88)	26.02 (1.42)
Visuospatial	1.81 (0.40)	1.89 (0.31)	1.81 (0.40)	1.88 (0.35)	1.67 (0.49)	1.80 (0.40)	1.91 (0.28)	1.82 (0.39)	1.81 (0.40)	1.84 (0.37)	1.68 (0.48)	1.72 (0.46)	1.83 (0.39)	1.33 (0.65)	1.89 (0.47)	1.84 (0.37)
Exec. function (Clock test)	2.88 (0.34)	2.76 (0.52)	2.92 (0.27)	2.88 (0.32)	2.87 (0.35)	2.90 (0.30)	2.84 (0.41)	3.00 (0.00)	2.89 (0.32)	2.98 (0.14)	2.94 (0.25)	2.96 (0.20)	3.00 (0.00)	2.76 (0.50)	2.83 (0.38)	2.84 (0.43)
Naming	3.0 (0.0)	2.95 (0.20)	2.92 (0.27)	2.96 (0.19)	2.93 (0.26)	3.03 (0.41)	2.99 (0.12)	2.88 (0.33)	2.96 (0.19)	2.96 (0.20)	2.94 (0.25)	2.88 (0.33)	2.96 (0.21)	2.85 (0.36)	2.94 (0.24)	3.00 (0.00)
Attention and concentration	5.88 (0.34)	5.90 (0.30)	5.58 (0.70)	5.90 (0.36)	5.60 (0.83)	5.75 (0.68)	5.80 (0.53)	5.88 (0.33)	5.87 (0.48)	5.84 (0.41)	5.77 (0.50)	5.92 (0.28)	5.65 (0.65)	5.67 (0.78)	5.83 (0.51)	5.82 (0.39)
Language	2.19 (0.83)	2.49 (0.68)	2.42 (0.81)	2.46 (0.64)	1.87 (0.83)	2.30 (0.72)	2.49 (0.80)	1.18 (0.95)	2.13 (0.81)	2.49 (0.67)	1.32 (0.87)	1.76 (0.83)	2.00 (0.74)	1.48 (0.97)	1.50 (1.04)	1.27 (1.02)
Abstraction	1.94 (0.25)	2.0 (0.0)	1.88 (0.33)	1.89 (0.37)	2.00 (0.00)	1.93 (0.58)	1.91 (0.33)	1.76 (0.44)	1.91 (0.30)	1.96 (0.20)	1.94 (0.25)	1.96 (0.20)	1.96 (0.21)	1.85 (0.36)	2.00 (0.00)	1.98 (0.15)
Memory	4.25 (1.0)	3.75 (1.26)	3.88 (1.03)	3.69 (1.20)	3.80 (1.26)	3.43 (1.42)	3.99 (1.28)	3.59 (1.06)	3.40 (1.29)	3.37 (1.20)	3.87 (1.15)	3.76 (1.27)	3.57 (1.34)	3.42 (1.28)	3.61 (1.09)	3.27 (1.40)
Orientation	6.00 (0.000)	5.99 (0.09)	6.00 (0.00)	6.00 (0.00)	6.00 (0.00)	5.95 (0.39)	6.00 (0.00)	6.00 (0.00)	5.98 (0.14)	6.00 (0.00)	5.97 (0.18)	5.96 (0.20)	5.91 (0.29)	6.00 (0.00)	6.00 (0.00)	5.98 (0.15)

Note: MoCA = Montreal Cognitive Assessment.

Table 3. Contribution of age, education, and gender to the MoCA total score

Predictor variables	Predicted variables		
	Standardized β	*t* value	*p* value
MoCA total score			
ANOVA (regression) $F_{3,\ 706} = 103.509$			
$p = .000$, adjusted $R^2 = .358$			
(Constant)		64.744	.000
Age	−0.228	−5.779	.000
Education	0.182	4.603	.000
Gender	0.089	2.527	.012

Note: ANOVA = analysis of variance; MoCA = Montreal Cognitive Assessment.

Table 4. Discriminant validity of the Montreal Cognitive Assessment (MoCA) for the diagnosis of parkinsonian dementia

MoCA											
Cutoff	17	20	**21**	22	23	24	25	26	27	28	29
Sensitivity	65	77	**82**	82	88	88	94	94	94	100	100
Specificity	91	91	**90**	89	82	77	64	43	25	9	2
PPV	38	42	**42**	40	30	25	19	13	10	9	8
NPV	97	98	**98**	98	99	99	99	99	98	100	100
% Correctly diagnosed	89	90	**90**	89	82	78	66	47	31	17	10

Note: MoCA = Montreal Cognitive Assessment; PPV = positive predictive value; NPV = negative predictive value. Bolded numbers represent cutoff values.

MoCA score for the total sample was 27.20, and it is included in the upper range of scores in the different normative studies (Conti et al., 2015; Kenny et al., 2013; Narazaki et al., 2013; Oren et al., 2015; Santangelo et al., 2014). This result may reflect the narrow inclusion criteria in our study. In gender, the examination of the mean scores, even though it was found to be statistically significant, it shows that the actual mean differences in the MoCA test between the female subgroup (27.34) when compared with the male subgroup (27.05) were in reality marginal.

Regarding the criterion validity of the MoCA test, the cutoff score of 21 in our study showed optimal sensitivity and specificity. This score is in agreement with the results of other studies (Dalrymple-Alford et al., 2010), but it differs with the results by Hoops and colleagues (2009) who found an optimal screening cutoff score of 24/25 (sensitivity = 0.82, specificity = 0.75) for the detection of PDD. Methodological differences in our study may explain the discrepancies in our results compared with the results of the latter study. So the clinical sample in our study ($n = 19$) was smaller in comparison with all the other studies that examined an optimal screening cutoff score for the detection of PDD (Dalrymple-Alford et al., 2010; Hoops et al., 2009).

The strengths of the present study involve the standardization of the MoCA test in the Greek language, involving most categories of adulthood age, the fairly large sample, and the usefulness of the test in the assessment of participants exhibiting parkinsonian dementia. Finally, the relationship of the MoCA scores with the specific neuropsychological tests used is an additional strength of our study. Limitations of the present study involve that no assessment of premorbid intelligence in both samples (normative and clinical) and no research to assess the sensitivity between the Greek version of the MoCA and MMSE were taken place. In the first case, there is a great possibility that the comparisons may have been significantly influenced by the baseline cognitive abilities of our participants. Along the same lines, because in the present study no memory tests were used, the normative sample may have included participants with memory loss, biasing our findings. Also, some items of the MoCA may suffer from cultural bias, possibly due to the different language used (Greek version of the test). Finally, it should be noted that the cutoff scores of every study indicate points of transition, and they should be interpreted with caution. Individual variations, especially in the older participants, could affect the performance of the participants.

Further research is needed to focus on the clinical utility of the proposed norms and their relationship with other neuropsychological measures (e.g., memory) including the MMSE. Future studies may also give emphasis on the comparison of the sensitivity between MoCA and MMSE in the Greek language, along with the collection of clinical data in participants of various neurological diseases, and this way add more clinical value in the proposed norms.

Conflict of Interest

None declared.

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