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Executive Function and Personality Predict Instrumental Activities of Daily Living in Alzheimer Disease

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Abstract

Objective—Previous research shows that executive function (EF) and personality independently predict functional decline. Our objective was to determine whether personality traits predict independence with instrumental activities of daily living (IADLs), after accounting for executive dysfunction, in a mixed sample of patients with amnesic mild cognitive impairment (MCI) and Alzheimer disease (AD).

Methods—In a cross-sectional analysis at a university medical center, 63 healthy older adults (median age: 67.6 years; 71% women) and 119 patients (median age: 75.0 years; 58% women) with varying degrees of AD (probable AD: 85; possible AD: 3; amnesic MCI: 31) were studied. Standardized neuropsychological measures, NEO Five-Factor Inventory (NEO-FFI), and informant-report Lawton and Brody IADL scales were used. All participants underwent neuropsychological evaluation, including administration of self- and informant-report NEO-FFI. Patients additionally underwent neurologic examination, and their informants completed the Lawton and Brody IADL scale.

Results—When testing the association between EF and personality on IADLs in the patient sample, conceptual card sorting, informant-report Openness, and informant-report Conscientiousness all significantly predicted IADLs, after accounting for age, education, and depression. In addition, a significant interaction showed that low Conscientiousness and executive dysfunction, in combination, can predict impairment of IADLs.

Conclusion—Personality has a unique association with IADLs in patients with AD pathology that is not explained by EF. The findings confirm prior speculation that personality, in addition to cognitive dysfunction, is a risk factor for functional decline. Early identification of vulnerable individuals may allow for intervention to prolong functional independence.

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APPENDIX: SUPPLEMENTARY MATERIAL

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Keywords

Executive function; personality; instrumental activities of daily living; Alzheimer disease; mild cognitive impairment

INTRODUCTION

Loss of functional independence is a diagnostic feature of dementia. By definition, demented patients lose capacity for basic activities of daily living (i.e., bathing, feeding, toileting) and instrumental activities of daily living (IADLs; i.e., financial management, shopping, food preparation). A decline in IADLs occurs in the early stages of dementia and even in individuals with mild cognitive impairment (MCI), a prodromal stage of dementia.^{1,2} As one would expect, functional impairment burdens caregivers, as indicated by a host of economic, social, and psychological challenges.³ However, with the exception of cognitive dysfunction, we do not have a clear understanding of the clinical and individual factors associated with functional status.

Of the spheres of cognition, executive function (EF) is associated with proficiency in IADLs among older adults. EF refers to higher order cognitive abilities involved in planning, initiation, monitoring, inhibition, and flexibility in goal-oriented behavior.⁴ Cross-sectional studies show that EF is associated with IADL independence in patients with Alzheimer disease (AD).^{5,6} Longitudinal research also shows that the presence of executive dysfunction predicts further decline in IADLs.⁷ In addition to EF, memory is a significant cognitive predictor of functional impairment.⁸ A longitudinal study found that both memory and EF independently predicted the rate of change in IADLs in a cognitively heterogeneous older adult sample.⁹ However, when compared with other cognitive domains (e.g., memory, visuospatial, and motor processes), EF appears to account for greater variance in IADLs.^{10,11} This predominant influence of EF is not surprising considering the demand for higher order cognitive abilities in managing IADLs.

Personality is another potential predictor of functional status that has received attention. The most widely studied paradigm is the Five-Factor Model (FFM), comprising five personality traits: Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness.¹² Studies consistently show that AD patients have higher Neuroticism and lower Conscientiousness relative to healthy age-matched control subjects,^{13,14} and meta-analytic estimates suggest that these traits, and possibly lower Openness, prospectively predict the onset or progression of dementia.¹⁵ Similar personality characteristics are found in patients with MCI.¹⁶ In addition, among older adult primary care patients of varying cognitive status and health, higher Neuroticism and lower Extraversion, Conscientiousness, and Agreeableness are all associated with functional disability, independent of actual illness burden.¹⁷ One AD study found that decreased Openness and Conscientiousness were associated with informant-reported loss of independence.¹⁸ Another found that among community-dwelling older persons, self-reported IADL impairments were associated with higher self-reported Neuroticism and lower Conscientiousness, whereas informant-reported IADL deficits were related to higher self-reported Neuroticism, lower Agreeableness, and

lower Openness.¹⁹ Also, longitudinal research shows that low Conscientiousness and high Neuroticism in primary care older adults predict greater physician-assessed illness burden over a 4-year period, which would presumably lead to greater functional impairment.²⁰ Thus, evidence suggests that personality factors can have an impact on a healthy or demented person's ability to meet the demands of IADLs.

The effects of personality on IADLs needs further inquiry and replication, and, importantly, such investigation should examine whether the influence of personality holds after accounting for cognitive function. Numerous studies show links between EF and personality traits,^{21,22} fueling debate on the extent of overlap between these constructs. Although most theorists view general cognitive ability as a strong correlate of the Openness domain of personality²³—which has also been called “intellect” in some models of personality—a less appreciated link may be present between EF and Conscientiousness. For instance, it was suggested that the association between Conscientiousness and health-related behaviors in an age-stratified community sample may be explained by differences in EF.²⁴ Whereas others disagreed with this conclusion²⁵ on the basis of low correlations between EF and Conscientiousness measures in college samples,²⁶ a different state of affairs may prevail in patient populations. Previous studies investigating functional disability in aging populations have not accounted for the potential overlap between EF and personality. The goal of the current study was to therefore investigate the independent and combined influence of cognitive function and FFM traits on IADLs in a mixed sample of patients with amnesic MCI (aMCI) and AD. We hypothesized that EF and personality would independently predict IADL impairment and that personality would predict IADL impairment even after accounting for influence of EF.

METHODS

Participants

Participants were 63 healthy older adults who were recruited through advertisements and 119 patients with AD or prodromal AD (i.e., aMCI) who were recruited through the University at Buffalo Alzheimer's Disease and Memory Disorders Center. Of the 119 patients, 85 were diagnosed with probable AD, 3 with possible AD, and 31 with aMCI. AD and aMCI patients were combined into a single patient sample to encompass the varying degrees of AD. All diagnoses were reached through a multidisciplinary consensus conference with at least one neuropsychologist and at least one neurologist. Diagnosis of aMCI was based on the Peterson criteria,¹ and diagnosis of probable and possible AD was based on the National Institute of Neurological and Communicative Disorders and Stroke, and the Alzheimer's Disease and Related Disorders Association criteria.²⁷ Exclusion criteria for all participants were neurologic diseases (aside from aMCI and AD in the pathologic group) that could impact cognitive function (e.g., Parkinson disease, vascular dementia), developmental disorders, or severe psychiatric illness (e.g., major depression, bipolar disorder). Informant data were collected from a family member for measures of personality and functional independence as described below.

This research was approved by the Institutional Review Board of the State University of New York at Buffalo, and informed consent was obtained from all participants.

Demographic characteristics of patients and the healthy comparison group are summarized in Table 1.

Procedure

Neurologic Assessment—All patients underwent neurologic examination in a separate appointment by a neurologist (KS or MP). The examination included cognitive screening with the Folstein Mini-Mental State Exam.²⁸

ADL Assessment—At the time of neurologic assessment, family members completed the Lawton and Brody scales, which are two checklists assessing degree of independence with basic activities of daily living and IADLs.²⁹ Higher scores on these measures indicate greater functional impairment. Thus, information related to functional status was collected on a separate day from cognitive testing, and informants were naive to cognitive test results.

Neuropsychological Evaluation—All participants underwent comprehensive cognitive testing on a separate day. This assessment took place within 3 months of the neurologic workup for patients. Cognitive evaluation was conducted under the supervision of a board-certified neuropsychologist (RHBB). The full cognitive battery along with descriptive data are presented in Table 2.

Depression—The Geriatric Depression Scale (GDS) was completed as part of the neuropsychological evaluation to assess current mood state.

Personality Assessment—Both informant- and self-report forms of the NEO Five-Factor Inventory (NEO-FFI) were administered.¹² The NEO-FFI is a 60-item questionnaire that assesses the FFM traits of Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness. Twelve items relate to each of the big five traits. Subjects are asked to rate the degree to which they agree with each statement as it relates to their own beliefs or attributes, on a five-point Likert scale (strongly disagree, disagree, neutral, agree, or strongly agree). Informants are asked to make the same ratings based on their perception of the individual being studied. Raw scores are converted into T-scores in accordance with published manual guidelines.¹²

Although the use of self-report personality ratings of cognitively intact individuals may be appropriate, concerns have been raised regarding the validity of self-report ratings of cognitively impaired individuals.^{14,18} Patients in early stages of AD have a diminished capacity for personal and social self-reflection.³⁰ Furthermore, patients with dementia may have trouble with comprehension of questionnaire items, leading to errors in ratings.³¹ In our sample, 16 patients were unable to complete the NEO-FFI survey because of comprehension difficulties. Of these 16 patients, 15 had a diagnosis of probable AD, with a mean Mini-Mental State Exam score of 17. Several other patients who completed the NEO-FFI verbalized that they did not understand many items and were unsure of their ratings. For these reasons, we relied on informant-report NEO-FFI ratings in our analyses, similar to other AD studies.^{18,32}

Data Analysis

The cognitive profile of the patient population was first characterized with a series of nonparametric Mann-Whitney U tests because of heterogeneity of variance and non-normality of cognitive measures. Between-group comparisons were also performed on the NEO-FFI scores using t tests.

Subsequent hypothesis testing analyses included only the patient group. The primary outcome measure was the informant-reported Lawton and Brody IADL scale. Univariate linear regression models were estimated with IADL score as the dependent variable and neuropsychological measures of memory, EF, and each of the informant-report NEO-FFI scores as independent predictors. These univariate models identified candidates for predicting IADLs in multivariate analyses. The significant univariate predictors were then carried forward into hierarchical multivariate analyses. To prevent problems related to multicollinearity, only the predictor with the highest coefficient for each cognitive domain (i.e., EF, memory) was retained in the final multivariate regression models.

There were two hierarchical regression analyses, one for memory and personality predicting IADLs and another focused on the association between EF and personality on IADLs. By way of example, for the EF regression analyses, Model 1 served as a base model containing age, education, and GDS score as control variables. Cognitive and personality variables were then added to this base model, in a sequential manner. In Model 2, the EF measure with the highest coefficient from the univariate regressions was added to the base model. In Model 3, significant personality variables identified in the univariate regressions were added to the base model but without the EF measure. In Model 4, the EF measure from Model 2 along with significant personality variables from Model 3 were added to the base model, testing EF and personality predictors together. Model 5 included the base model and all significant variables from Model 4 along with interaction terms for the EF measure and any significant personality measures. Only interaction terms between cognitive and personality measures were included to examine the association between cognition and personality on IADLs. The set of analyses for memory were conducted in the same manner. However, instead of having an EF measure as the cognitive variable, the memory measure with the highest coefficient in univariate analyses was included. Thus, the series of hierarchical regression analyses were built using a purposeful selection procedure as described by Hosmer and Lemeshow.³³ This approach to model-building facilitates examination of the extent to which each subsequent block of predictors accounts for unique variance in the outcome, over and above predictors already in the model. Examination of all residual and scatter plots indicated that the assumptions of normality, linearity, and homoscedasticity were all satisfied. Collinearity statistics (Tolerance and Variance Inflation Factor) were also within the acceptable range. The p value <0.05 was designated as the threshold for significance throughout.

RESULTS

Mann-Whitney U tests revealed that the patient sample performed significantly worse than the healthy comparison group across all cognitive measures (Table 2). These analyses served as a confirmation that the MCI/AD group, with whom primary research questions were concerned, indeed performed far worse than normal persons. Data for NEO-FFI scores are

presented in Table 3. Between-group comparisons using independent-sample *t* tests showed that patients were significantly lower than the healthy comparison group on self-reported Openness ($p < 0.001$). Scores showed that informants rated patients as being higher in Neuroticism ($p < 0.001$) and lower in Extraversion ($p = 0.006$), Openness ($p < 0.001$), and Conscientiousness ($p < 0.001$) in comparison with the healthy comparison group. Patient and informant NEO-FFI scores were significantly correlated for all traits: Neuroticism ($r = 0.42$, $p < 0.001$), Extraversion ($r = 0.37$, $p < 0.001$), Openness ($r = 0.34$, $p = 0.001$), Agreeableness ($r = 0.26$, $p = 0.008$), and Conscientiousness ($r = 0.30$, $p = 0.002$). However, as noted above, self-report scores for 16 patients could not be included.

Univariate Analyses

Univariate linear regression models revealed that Hopkins Verbal Learning Test-Revised Delayed Recall ($\beta = -0.19$, $p = 0.04$), Wechsler Memory Scale-Revised (WMS-R) Logical Memory Delayed Recall ($\beta = -0.21$, $p = 0.03$), WMS-R Visual Reproduction (VR) Delayed Recall ($\beta = -0.27$, $p = 0.003$), Delis Kaplan Executive Function Systems (DKEFS) Correct Sorts ($\beta = -0.46$, $p < 0.001$), DKEFS Description score ($\beta = -0.44$, $p < 0.001$), Trail Making Test, Part A ($\beta = 0.36$, $p < 0.001$), Trail Making Test, Part B ($\beta = 0.45$, $p < 0.001$), Digit Span Forward ($\beta = -0.23$, $p = 0.01$), and Digit Span Backward ($\beta = -0.40$, $p < 0.001$) were all significant independent cognitive predictors of IADL score. Of the FFM traits, informant-reported Openness ($\beta = -0.24$, $p = 0.008$) and Conscientiousness ($\beta = -0.36$, $p < 0.001$) were significant predictors of IADL score. Results for univariate regressions can be seen in Table S1. The significant variables from the univariate regressions were next entered into the hierarchical multivariate analyses (Table 4).

Hierarchical Multivariate Analyses of EF and Personality on IADLs

Model 1 represented the base model in our regression analysis in the patient sample, to which other variables were sequentially added. The predictors in this base model included age, education, and GDS score. There was a main effect of age (adjusted $R^2 = 0.04$). In Model 2, DKEFS Correct Sorts was added to the base model and was the only significant predictor in this model (adjusted $R^2 = 0.20$). Model 3 included informant-reported Openness and Conscientiousness along with the base model but not DKEFS Correct Sorts. In this model, there were significant main effects of age, Openness, and Conscientiousness (adjusted $R^2 = 0.18$). In Model 4, DKEFS Correct Sorts was added to the base model along with Openness and Conscientiousness. There were main effects of DKEFS Correct Sorts, Openness, and Conscientiousness on IADL score (adjusted $R^2 = 0.28$). In the final model, Model 5, all the variables from Model 4 were included as well as interaction terms of DKEFS Correct Sorts with Openness and Conscientiousness. There were significant main effects of DKEFS Correct Sorts and Conscientiousness. There was also a significant interaction between DKEFS Correct Sorts and Conscientiousness (adjusted $R^2 = 0.30$). Overall, main effects demonstrate that older age, a low score on DKEFS Correct Sorts, low Openness, and low Conscientiousness are all associated with greater functional decline. The significant interaction demonstrates that low scores on both DKEFS Correct Sorts and Conscientiousness are predictive of greater impairment in IADLs than the sum of their main effects would suggest.

Hierarchical Multivariate Analyses of Memory and Personality on IADLs

As above, Model 1 represented the base model with age, education, and GDS score as predictors and IADL score as the outcome. There was a main effect of age in this model (adjusted $R^2 = 0.04$). In Model 2, the WMS-RVR Delayed Recall was added to the base model and was the only significant predictor of IADLs (adjusted $R^2 = 0.07$). Model 3 included informant-reported Openness and Conscientiousness along with the base model, without WMS-R VR. In this model, there were significant main effects of Openness and Conscientiousness (adjusted $R^2 = 0.18$). In Model 4, WMS-R VR Delayed Recall was added to the base model along with Openness and Conscientiousness. There were main effects of WMS-R VR Delayed Recall, Openness, and Conscientiousness on IADL score (adjusted $R^2 = 0.21$). In the final model, Model 5, all the variables from Model 4 were included as well as interaction terms of WMS-R VR Delayed Recall with Openness and with Conscientiousness. There were significant main effects of Openness and Conscientiousness in this final model. There were no significant interaction effects (adjusted $R^2 = 0.20$). Overall, main effects demonstrate that older age, a low score on WMS-R VR Delayed Recall, low Openness, and low Conscientiousness are all associated with greater impairment in IADLs.

DISCUSSION

Past research firmly established the intuitive correlation between neuropsychological deficits and IADLs among healthy older adults and demented patients. Although some studies suggest a link between personality traits and IADLs,^{17–19} those results did not account for EF and are best considered preliminary and in need of further investigation. In this study, we found that both EF and personality are independently associated with IADLs in a mixed aMCI/AD sample, after controlling for age, education, and depression. Both EF and memory significantly predicted IADLs, as previously shown.⁹ Even after accounting for this effect, we find that personality exerts a unique influence on functional ability. Finally, we found an interaction between Conscientiousness and EF, in that low Conscientiousness and executive dysfunction, in combination, present a higher risk for poor functional status than the mere sum of their independent effects would suggest or when these problems are encountered singly.

There is currently debate in the literature regarding the extent of conceptual overlap between EF and Conscientiousness, although potential differences across populations (i.e., clinical versus community versus younger adult) do not appear to have yet entered into the discussion.^{24,25} Here, we attempted to clarify the theoretical boundaries of these two constructs in the context of studying functional status in people with varying degrees of AD-like pathology. Post-hoc correlations showed that informant-reported Conscientiousness is correlated with all measures of EF in our test battery with correlation coefficients ranging from $r = 0.19$ to $r = 0.29$. In addition, Conscientiousness and all measures of EF were independently associated with IADLs. When entered into a regression model together, Conscientiousness remained a significant predictor of IADLs, beyond the effects of EF. Thus, our findings suggest that EF and Conscientiousness are related but represent not only distinct psychological constructs but also distinct predictors of an important outcome among

cognitively impaired persons. The most common components of Conscientiousness are probably the tendencies to be organized and prepared and to pursue goals with industry and consistency³⁴—features critical in maintaining IADL functioning. Even these tendencies, however, in the absence of sufficient EF, may not stave off IADL impairment, as the interaction between the two suggests. However, further research is needed to better understand the nature of this moderation between EF and Conscientiousness.

Our work also has important clinical implications for identifying and potentially treating older adults at risk for functional impairment. Our findings suggest that in addition to cognitive dysfunction detected on screening evaluations, personality assessment may also be worthwhile in identifying individuals at risk of functional decline. With respect to treatment, there is evidence that behavioral interventions targeted at improving aspects of EF may improve functional ability. A study showed that a long-term cognitive training program focused on improving reasoning ability was associated with less difficulty in performing IADLs in healthy older adults.³⁵ Improvements were still found at a 5-year follow-up. Intervention involving personality change is perhaps more complicated. According to traditional personality theory, personality traits tend to remain stable throughout the lifespan,³⁶ although there are numerous reports of personality changes occurring in healthy older adults due to life transitions³⁷ or medical illness, such as dementia.¹⁴ Furthermore, growing evidence suggests that maladaptive aspects of personality may be correctable through psychological intervention, although these issues are complex.³⁸ One study aimed at reducing physician burnout demonstrated that intensive mindfulness training led to reduced Neuroticism and higher Conscientiousness.³⁹ However, it is yet to be shown that these types of behavioral interventions are effective in modifying potential neurogenic personality changes, although effects on cognition have been noted.⁴⁰ If successful, these interventions could have far-reaching benefits on functional status and quality of life for these individuals and their families.

Regarding limitations of our research, we acknowledge that the use of a mixed-patient sample is not ideal if the goal was to examine these issues *within* each separate stage of cognitive impairment. Another potential limitation of our research is the use of a cross-sectional design that does not allow us to examine changes in functional status over time. Clearly, there is a need for longitudinal research to examine the contributions of both personality and EF as well as memory to the trajectory of functional decline in patients with AD and aMCI. Our methods could also be criticized on the basis of shared method variance, because both IADLs and personality were rated by informants. Unfortunately, in persons with dementia, there is a lack of insight into personality changes and the understanding of test questions becomes compromised. Although we could analyze patient reports, it is important to consider the impact of these factors on the validity and interpretation of findings. Future research should further investigate the use of patient-reported personality traits in this population. Finally, we understand that IADLs are only one aspect of functional status. Other indicators of functional decline such as caregiver burden and increased utilization of medical and community resources should be examined as well. In our future work, we plan to include a broader spectrum of these elements of daily functioning.

In conclusion, the current findings show that cognitive dysfunction and personality both independently and interactively are associated with functional status in individuals with AD and aMCI. Awareness and detection of these risk factors of functional decline could allow for early intervention and help to minimize care-giver burden and other consequences of functional impairment. Future work should evaluate interventions aimed at improving EF and increasing Conscientiousness as a possible means of prolonging functional independence in these vulnerable individuals.

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TABLE 1

Demographic Characteristics of Participants

	Healthy (N = 63)		Patients (N = 119)	
	Mean	SD	Mean	SD
Age, yr	67.63	6.068	75.02	9.25
Sex, M/F	18/45		50/69	
Education, yr	16.16	2.516	13.83	2.67
Handedness, R/L	57/6		108/11	
Premorbid IQ ^a	114	6.51	102.3	11.5
GDS	4.54	4.04	6.63	5.34

Notes: SD: standard deviation.

^aIQ scores for eight patients were unavailable.

TABLE 2**Neuropsychological Profile of Patients and Healthy Participants**

Measure	Healthy (N = 63)	Patients (N = 119)	U	p
	Median	Median		
MMSE (/30)	29.0	22.0	674.0	<0.001
Boston Naming Test (/60)	59.0	45.0	427.0	<0.001
CIFA Letter Fluency, raw score	31.0	17.0	1.451.5	<0.001
CIFA Category Fluency, raw score	46.0	21.0	344.0	<0.001
Beery VMI, raw score	25.0	21.0	1.590.5	<0.001
HVLT-R Learning Total, raw score	28.0	11.0	169.0	<0.001
HVLT-R Delayed Recall, raw score	10.0	0.0	78.0	<0.001
WMS-R LM Immediate Recall, raw score	30.0	7.0	71.0	<0.001
WMS-R LM Delayed Recall, raw score	27.0	1.0	33.0	<0.001
WMS-R VR Immediate Recall, raw score	34.0	17.0	509.5	<0.001
WMS-R VR Delayed Recall, raw score	28.0	1.0	410.5	<0.001
WAIS III Digit Span Forward, raw score	7.0	6.0	2.363.0	<0.001
WAIS III Digit Span Backward, raw score	5.0	4.0	1.898.0	<0.001
Trail Making Test, Part A, sec	32.0	63.0	1183.5	<0.001
Trail Making Test, Part B, sec	70.0	296.0	457.0	<0.001
DKEFS Correct Sorts, raw score	10.0	3.0	413.5	<0.001
DKEFS Description Score, raw score	40.0	12.0	422.4	<0.001

Notes: Test statistics presented are for the Mann-Whitney U test comparing healthy participants with patients. MMSE: Mini-Mental State Exam; CIFA: Calibrated Ideational Fluency Assessment; VMI: Visual Motor Integration; HVLT-R: Hopkins Verbal Learning Test–Revised; WMS-R LM: Wechsler Memory Scale–Revised Logical Memory; WAIS-III: Wechsler Adult Intelligence Scale–3rd edition.

TABLE 3

NEO-FFI Scores for Patients and Healthy Participants

Measure	Healthy (N = 63)		Patients (N = 119)		t	df	p	d
	Mean	SD	Mean	SD				
Neuroticism, self, T-score ^a	45.71	9.24	48.21	9.96	-1.61	164	0.11	0.26
Extraversion, self, T-score ^a	52.62	9.71	51.67	10.59	0.56	164	0.56	-0.09
Openness, self, T-score ^a	53.42	10.96	46.89	9.96	3.94	164	<0.001	-0.62
Agreeableness, self, T-score ^a	55.59	10.62	53.55	10.99	1.17	164	0.24	-0.19
Conscientiousness, self, T-score ^a	48.68	10.83	47.56	10.74	0.65	164	0.52	-0.10
Neuroticism, informant, T-score ^b	45.04	9.95	55.68	12.44	-4.22	145	<0.001	0.94
Extraversion, informant, T-score ^b	51.00	9.79	44.97	10.32	2.81	145	0.006	-0.60
Openness, informant, T-score ^b	52.04	8.75	40.96	10.19	5.31	145	<0.001	-1.17
Agreeableness, informant, T-score ^b	53.96	8.75	50.86	11.59	1.33	145	0.19	-0.30
Conscientiousness, informant, T-score ^b	50.14	12.77	38.82	13.27	4.09	145	<0.001	-0.87

Notes: SD; standard deviation.

^aSelf-report scores are available for 103 patients.^bInformant-report scores are available for 28 participants in the healthy comparison group.

TABLE 4

Multivariate Models Predicting IADLs in Patient Group (N = 119)

Model 1 (Adjusted R ² = 0.04)			Model 2 (Adjusted R ² = 0.20)			Model 3 (Adjusted R ² = 0.18)			Model 4 (Adjusted R ² = 0.28)			Model 5 (Adjusted R ² = 0.30)		
β	p		β	p		β	p		β	p		β	p	
Age	0.20	0.04	Age	0.12	0.18	Age	0.19	0.03	Age	0.12	0.14	Age	0.11	0.19
Education	-0.13	0.18	Education	-0.01	0.92	Education	0.05	0.59	Education	0.12	0.19	Education	0.11	0.20
GDS	0.002	0.98	GDS	-0.03	0.70	GDS	-0.01	0.95	GDS	0.03	0.71	GDS	-0.03	0.68
			DKEFS Sorts	-0.43	<0.001				DKEFS Sorts	-0.36	<0.001	DKEFS Sorts	-1.06	0.01
						Openness	-0.22	0.02				Openness	-0.23	0.08
						Conscientiousness	-0.35	<0.001	Conscientiousness	-0.28	0.001	Conscientiousness	-0.48	<0.001
												DKEFS Sorts × Openness	0.22	0.53
												DKEFS Sorts × Conscientiousness	0.61	0.045

Model 1 (Adjusted R ² = 0.04)			Model 2 (Adjusted R ² = 0.07)			Model 3 (Adjusted R ² = 0.18)			Model 4 (Adjusted R ² = 0.21)			Model 5 (Adjusted R ² = 0.20)		
β	p		β	p		β	p		β	p		β	p	
Age	0.20	0.04	Age	0.15	0.13	Age	0.19	0.03	Age	0.13	0.12	Age	0.14	0.13
Education	-0.13	0.18	Education	-0.09	0.35	Education	0.05	0.59	Education	0.09	0.36	Education	0.09	0.36
GDS	0.002	0.98	GDS	<0.001	1.00	GDS	-0.01	0.95	GDS	-0.01	0.94	GDS	-0.01	0.88
			WMS-R VR Delay	-0.21	0.03				WMS-R VR Delay	-0.20	0.02	WMS-R VR Delay	-0.33	0.52
						Openness	-0.22	0.02				Openness	-0.21	0.049
						Conscientiousness	-0.35	<0.001	Conscientiousness	-0.34	<0.001	Conscientiousness	-0.39	0.001
												WMS-R VR Delay × Openness	-0.04	0.93
												WMS-R VR Delay × Conscientiousness	0.18	0.53