Validation of the Spanish Version of the Face Name Associative Memory Exam (S-FNAME) in Cognitively Normal Older Individuals

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Abstract

The Face Name Associative Memory Exam (FNAME) is a paired associative memory test that has demonstrated sensitivity to amyloid burden in cognitively normal individuals, a biomarker of preclinical Alzheimer's disease. Normative data adjusted for age were reported in American healthy individuals older than 57. We aimed to report the psychometric characteristics of a Spanish version of FNAME (S-FNAME) when administered to Spanish-speaking people. We sought to investigate convergent validity of S-FNAME with another memory measure and to identify which demographic characteristics might be associated with performance on S-FNAME. We administered the S-FNAME to 110 literate, cognitively normal, Spanish individuals older than 49 years from the Memory Clinic *Fundació ACE*. Construct validity of S-FNAME showed 2 components: face–name and face–occupation. A significant correlation between S-FNAME and Word List from the WMS-III supported convergent validity. The S-FNAME was also associated with age and gender. Thus, we provide normative data for age and gender.

Keywords: FNAME; Episodic memory; Preclinical Alzheimer's disease; Instrument validation

Introduction

One of the most common cognitive complaints of older adults consists of learning names of people they just met or in remembering the names of well-known individuals (Cargin, Collie, Masters, & Maruff, 2008; James, Fogler, & Tauber, 2008). Memory for faces and names remains a complex task that implicates associative occipitotemporal cerebral regions with extensive connections to cortical areas. Because it is a complex episodic memory task that has ecological validity, face–name associative memory has been proposed as a potential test for Alzheimer's disease (AD) (Rentz et al., 2011; Werheid & Clare, 2007).

The Face Name Associative Memory Exam (FNAME), a cross-modal associative memory test developed by Rentz and colleagues (2011), has demonstrated sensitivity to amyloid burden in cognitively normal individuals, a biomarker of preclinical AD. In contrast to another test of memory such as the 6-Trial Selective Reminding Test (SRT), which was not correlated with Aβ deposition, lower performances on FNAME (retention of face–name associations) were shown to be significantly correlated with higher levels of Aβ deposition in frontal, precuneus, posterior cingulate, and lateral parietal cortices in cognitively normal subjects. Thus, performances on FNAME seem to be sensitive to subtle memory changes due to preclinical AD (Rentz et al., 2011).

The FNAME was recently validated in an American cognitively normal elderly population as a means of having a potential tool for the neuropsychological detection of preclinical AD. Normative data of FNAME were stratified by age ranges because performances on this test were significantly correlated with age, but not gender or education. A Spanish version of the FNAME

(S-FNAME) (Quiroz et al., 2014) was created by the same group that designed the original test (Rentz et al., 2011) to facilitate the administration of the test to Spanish-speaking individuals. However, up to now, there is no normative data for European Spanish-speaking people.

The purpose of the present study was to report the psychometric characteristics of the S-FNAME when administered to a Spanish-speaking sample from Barcelona, Spain. Similar to the validation study performed on the FNAME in the United States (Amariglio et al., 2012), we aimed to investigate convergent validity of the S-FNAME with another established memory measure and also to identify which demographic characteristics might be associated with performance on the S-FNAME. Ultimately, we sought to establish the S-FNAME as a measure that could be used in a Spanish sample involving future studies that will be investigating subtle cognitive decline associated with preclinical AD.

We hypothesize that, similar to the American validation (Amariglio et al., 2012), older age will be related to lower performances on S-FNAME. We will also examine whether other demographic factors are related to S-FNAME performances, and normative data will be provided on these factors as well.

Methods

Subjects

All participants were from the Memory Clinic of *Fundació ACE, Institut Català de Neurociències Aplicades* (Barcelona, Spain), either referred by their primary care physician or had attended the annual "Open House Initiative" (OHI) for the citizens of Barcelona that is associated with World Alzheimer's Day. From the 381 participants who attended OHI and who subsequently completed neurological and neuropsychological examinations, we only selected those older than 49 years old, who had a Mini Mental State Examination (MMSE) score ≥ 27, preserved performance on the Neuropsychological Battery of Fundació ACE, and were diagnosed at a consensus meeting as cognitively normal, without psychiatric disease.

All subjects were administered an S-FNAME, similar to the FNAME as previously reported (Amariglio et al., 2012). The 110 subjects included in the analysis met the following criteria: they were older than 49 years, literate with at least minimal writing abilities, and were classified as cognitively normal. They had preserved performance on a global cognitive screening test (the Spanish version of the MMSE ≥ 27; Blesa et al., 2001; Folstein, Folstein, & McHugh, 1975); had a normal performance on the neuropsychological battery used in Fundació ACE (NBACE; Alegret et al., 2012, 2013); had a Clinical Dementia Rating Score = 0 (Morris, 1993); had no functional impairment secondary to decline in cognition; were without relevant depressive/anxiety symptoms (score < 11) on the Spanish version of the Hospital Anxiety and Depression (HAD) Scale (De las Cuevas, García-Estrada, & González, 1995; Zigmond & Snaith, 1983); had no other psychiatric illness; and were without severe auditory or visual abnormalities, including glaucoma and cataracts.

From the initial 381 subjects, 271 were excluded from the original analysis because they did not complete the diagnostic process ($n = 137$), they were younger than 50 ($n = 2$), were diagnosed in Fundació ACE as mild cognitive impairment (MCI) ($n = 99$) or dementia ($n = 12$) at the time of their comprehensive neuropsychological and neurological assessments, or the presence of a psychiatric disease or HAD score in the anxiety or depression range >10 ($n = 21$).

One hundred and ten cognitively normal subjects older than 49 years of age (82 women and 28 men) were included for analyses. The mean age of participants was 63.8 ± 7.6 (range: 51–84). Three percentage of subjects were literate but had less than elementary school (i.e., 1–5 years of formal education), 13% had elementary school, 29% had high school, and 55% had a Bachelor's degree. Most of the participants were born in Barcelona (65.5%) or in another region of Catalonia (8.8% in Lleida, 3.9% in Tarragona, and 0.9% in Girona), 18.2% were born in another region of Spain, 0.9% in South America, and 1.8% in Africa. 68.2% of participants were bilinguals and 31.8% monolinguals. The bilingual participants spoke equally well in both Catalan and Spanish.

The mean score on the MMSE was 29.5 ± 0.9 (range: 27–30). Scores on NBACE are detailed in Table 1.

With regard to depression and anxiety scores on the HAD, no subject had anxiety or depression disorders. The whole group had mean scores on anxiety and depression HAD subscales of 4.7 ($SD = 2.6$) and 2.5 ($SD = 2.4$), respectively.

All of the data included in this study were obtained in compliance with the regulations of industrial assay and the study followed the declaration of Helsinki guidelines. Written informed consent was obtained from all participants prior to any research evaluations.

Neurobehavioral Assessment

All of the participants received an extensive neurobehavioral evaluation including medical history and physical examination, neurological history and exam, and a neuropsychological assessment. The clinical classification of each individual was initially

Table 1. Descriptive statistics for NBACE tests for the whole sample

Test	Range	Mean (SD)
Global orientation	0–15	14.96 (0.23)
Verbal Learning WMS-III[a]	0–48	31.76 (5.26)
Delayed recall WMS-III	0–12	8.10 (2.15)
Recognition Memory WMS-III	0–24	23.09 (1.11)
Digit Span Forward WAIS-III	0–16	8.79 (1.96)
Digit Span Backwards WAIS-III	0–14	5.93 (1.70)
Block Design WAIS-III	0–4	3.98 (0.13)
Imitation praxis	0–4	3.99 (0.09)
Ideomotor praxis	0–4	4.00 (0.00)
Visual Naming (15-BNT)	0–15	14.85 (0.42)
Poppelreuter's test (responses)	0–10	9.93 (0.29)
15-OT (responses)	0–15	14.03 (0.88)
Luria's Clock test	0–4	3.78 (0.41)
Automatic inhibition SKT (s)	≥0	21.83 (5.31)
Automatic Inhibition SKT (error)	0–34	0.39 (0.78)
Phonetic verbal fluency	≥0	17.23 (4.40)
Semantic verbal fluency	≥0	21.11 (5.47)
Similarities WAIS-III	0–15	13.05 (1.67)

Notes: Range represents total possible range on each test. *SD* = standard deviation; WMS-III = Wechsler Memory Scale, Third Edition; WAIS-III = Wechsler Adult Intelligence Scale, Third Edition; 15-BNT = the abbreviated Boston Naming Test with 15 items; 15-OT = the 15-Objects test; SKT = Syndrom Kurtz Test; s = time in seconds.
[a]Verbal learning WMS-III = 1st + 2nd + 3rd + 4th trial scores.

made by the neurologist based on the clinical evaluation, and this was later reviewed by the study team including neurologists and neuropsychologists at a consensus diagnostic conference.

As mentioned previously, each participant also completed the Spanish version of the MMSE (Blesa et al., 2001) to assess their global cognitive functioning, the Spanish version of the HAD Scale (De las Cuevas et al., 1995) and the Spanish version of the short form of the Neuropsychiatric Inventory (Boada, Tárraga, Modinos, López, & Cummings, 2005) to measure psychiatric symptoms, and the Blessed Dementia Rating Scale (Blessed, Tomlinson, & Roth, 1968) to assess functionality.

Neuropsychological Assessment

An S-FNAME (Amariglio et al., 2012) was adapted for the present study, using pictures that were taken of subject volunteers who gave consent for their picture to be used in research, and Spanish names and occupations (Quiroz et al., 2014). As detailed elsewhere (Amariglio et al., 2012), the test begins with an exposure to all 16 faces (face study phase). Subjects were shown four faces to a page, one face in each quadrant. They were asked to look at each face for a total of 2 s until they had seen all 16 faces. To control the time, the examiner used his/her finger to point to each one of the 16 faces for 2 s. The subject had to read the name below and try to learn each face–name pair. The same procedure was repeated with the 16 face–occupation pairs.

In the *Initial study of face–name pairs (FN–N)*, subjects were then presented the same 16 faces with names underneath and were asked to study the name that goes with the face. Subjects were given only one exposure to learn all 16 FN–N pairs. In the *Initial cued recall of face–name pairs*, the subjects were then shown the face and were asked to recall the name that goes with the face. The correct number of FN–N pairs was recorded as an initial learning score for names (ILN). In the *Initial study of face–occupation pairs (FN–O)*, subjects were shown the same faces, but this time with occupations underneath. The FN–O pairs were presented in the same manner as the FN–N pairs until all 16 FN–O pairs were studied. In the *Initial cued recall of face–occupation pairs*, subjects were again shown the face and were asked to recall the occupation that goes with the face. Correct recall of FN–O pairs was tabulated as initial learning of occupations (ILO). In the *Immediate cued recall*, subjects were shown the face and were asked to recall the name (CRN) and occupation (CRO) that was associated with the face. In the *30-minute delayed cued recall*, subjects were again presented the face and were asked to recall the name (CRN30) and occupation (CRO30) associated with the face. Score for each S-FNAME subscale (ILN, ILO, CRN, CRO, CRN30, and CRO30) ranged from 0 to 16, subtotal scores for names (FN–N = ILN + CRN + CRN30) and occupations (FN–O = ILO + CRO + CRO30) were out of 48, and total score for S-FNAME (ILN + ILO + CRN + CRO + CRN30 + CRO30) was out of 96. Taking into account that CRN30 and CRO30 subtests might to be administered 30 min after the initial subtests, the S-FNAME takes between 35 and 40 min.

Additional neuropsychological tests were administered as part of the diagnostic assessment (NBACE, see Alegret et al., 2012 for details) and it includes measures sensitive to orientation, attention, verbal learning and long-term memory, language, visual gnosis, praxis, and executive functions. The tests were as follows: Temporal, Spatial and Personal Orientation; Digit Span Forwards and Backwards, Block Design, and Similarities subtests of Wechsler Adult Intelligence Scale-Third Edition; The Word List Learning test from the Wechsler Memory Scale-Third Edition (WMS-III), including a recognition task; Verbal comprehension (two simple, two semi-complex, and two complex commands); an abbreviated 15-item confrontation naming test from the Boston Naming Test; the Poppelreuter test; Luria's Clock test; Ideomotor and Imitation praxis; the Automatic Inhibition subtest of the Syndrom Kurtz Test; Phonetic Verbal Fluency (words beginning with "P" during 1 min); Semantic Verbal Fluency ("animals" during 1 min); and the Spanish version of the Clock Test.

All of the neuropsychological tests, except for the S-FNAME, were used in the diagnostic process to classify participants as cognitively healthy and were carried out in the Diagnostic Unit of *Fundació ACE* by one of the four neuropsychologists (AE, GO, AS, and MA). The results of each examination were reviewed by all of the neuropsychologists, and scoring was arrived at by consensus to ensure reliability of the data.

Statistical Analysis

Statistical analysis was performed using SPSS20 (SPSS Inc., Chicago, IL). All data were examined for normality, skew, and restriction of range.

To determine whether S-FNAME subscales were grouped in face–name and face–occupation components, construct validity of the S-FNAME was assessed by principal component analysis. To assess convergent validity, S-FNAME subscores were correlated with learning, long-term memory, and recognition memory scores of the Word List from the WMS-III. A divergent validity analysis was conducted by correlating the total S-FNAME scores with nonmemory NBACE tests.

Analysis of variance was used to obtain the multivariate effect of gender (men vs. women), education (with vs. without Bachelor's degree), and age (≤ 65 vs. >65) on the total score of S-FNAME. The same 2×2 factorial design was applied for all the variables of the measure (subscores: ILN, ILO, CRN, CRO, CRN30, and CRO30 and summary scores: FN-N, FN-O, and total). Tests of normality of S-FNAME scores were also calculated. The η^2 values were reported as a measure of effect size.

With regard to the S-FNAME normative data, we reported only those factors that were significant. If more than one factor was significant (either age: ≤ 65 vs. >65; gender: men vs. women; and educational level: with vs. without Bachelor's degree), we reported the combination of these factors in the descriptive table.

As a consequence of the sample size, confidence intervals of means and medians were calculated using bootstrapping, in order to provide a more accurate estimation of the two parameters (Davison & Hinkley, 1997; DiCiccio & Efron, 1996). Bootstrapping is the practice of estimating properties of an estimator by measuring those properties when sampling from an approximating distribution. These distributions were usually obtained by a resampling method. In the case of this study, 1,000 resamplings were executed. Moreover, medians and their corresponding confidence intervals under bootstrapping analyses were also included, in order to have the central values of the distribution and their population estimation. For all the analyses, an effect was considered significant when $p < .05$.

Results

The S-FNAME subtests were highly correlated with each other, with values ranging from 0.47 to 0.95 (see Table 2). The scores on the FN-N were also highly correlated with the scores on the FN-O ($r = .55$, $p < .001$; see Fig. 1). The Kaiser–Meyer–Oklin value of 0.83 and Bartlett's Test of Sphericity ($p < .001$) supported the factorability of the correlation matrix. Construct validity of the S-FNAME, assessed by principal component analysis, showed that the most consistent solution was constituted by two components. As detailed in Table 3, the first component grouped the three face–occupation memory subtests (ILO, CRO, and CRO30) and the second component grouped the three face–name memory subtests (ILN, CRN, and CRN30), explaining 94.8% of the total variance. That is, the first component (face–occupation) was composed of tests assessing face–occupation associative memory and the second component (face–name) was composed of tests measuring face–name associative memory. The first component explained the 47.1% and the second component explained 47.7% of the total variance.

As shown in Fig. 1, most of the subjects obtained better scores on the total face–occupation (FN–O) than on the total face–name (FN–N). Moreover, the whole sample obtained higher performances on the FN–O (mean = 21.2, $SD = 9.9$) than on the FN–N (mean = 11.3, $SD = 8.3$).

The data set of S-FNAME was normally distributed, both classifying by gender and age.

Age (divided in two groups taking the cutoff of 65: $F(1, 107) = 28.51$, $p < .001$; $\eta^2 = 0.087$; age in years: $r = -.41$, $p < .001$) and gender ($F(1, 107) = 14.89$, $p < .001$; $\eta^2 = 0.029$) had a statistically significant effect on the S-FNAME total summary score,

Table 2. Pairwise correlation of S-FNAME subtests

S-FNAME subtests	ILN	ILO	CRN	CRO	CRN30	CRO30
ILN	—	0.57*	0.87*	0.53*	0.88*	0.51*
ILO		—	0.56*	0.95*	0.52*	0.93*
CRN			—	0.55*	0.94*	0.52*
CRO				—	0.50*	0.95*
CRN30					—	0.47*
CRO30						—

Notes: S-FNAME = Spanish version of the Face Name Associative Memory Exam; ILN = initial learning for names; ILO = initial learning for occupations; CRN = immediate cued recall for names; CRO = immediate cued recall for occupations; CRN30 = delayed cued recall for names; CRO30 = delayed cued recall for occupations.
*$p < .001$.
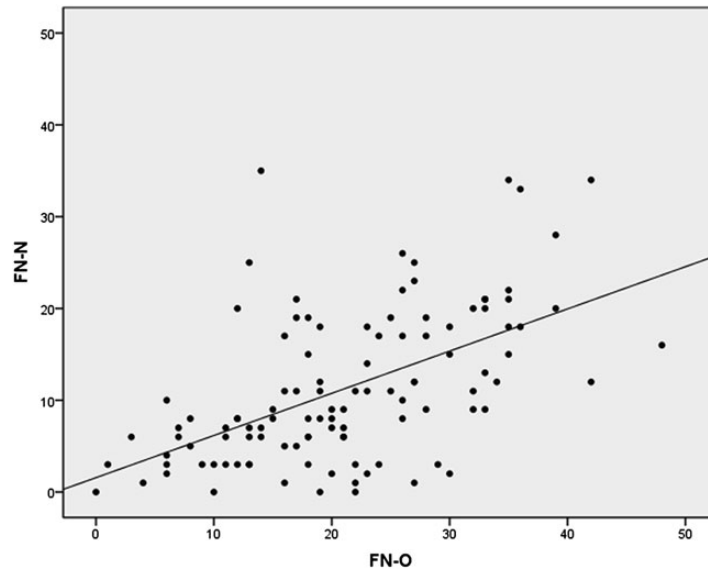
Fig. 1. Relationship between the total face–name and the total face–occupation association performances.

Table 3. Two components of S-FNAME variables

	Component 1 (face–occupation)	Component 2 (face–name)
CRO30	0.947	
CRO	0.944	
ILO	0.927	
CRN30		0.943
CRN		0.924
ILN		0.901

Note: The values correspond to the correlation of each S-FNAME subscale with each component. CRO30 = delayed cued recall for occupations; CRO = immediate cued recall for occupations; ILO = initial learning for occupations; CRN30 = delayed cued recall for names; CRN = immediate cued recall for names; ILN = initial learning for names.

but not on education (with and without Bachelor's degree groups: $F(1, 107) = 0.23$, $p = .629$; $\eta^2 = 0.005$). The interaction between age and gender was statistically significant ($F(1, 107) = 3.92$, $p < .05$). Thus, we chose to show the data as a combination of both factors. Women (mean = 62.55, $SD = 7.49$) were significantly younger than men (mean = 67.43, $SD = 6.80$). We report mean and median performance scores by age and gender (see Table 4).

To assess convergent validity, S-FNAME scores were correlated with performances on another memory test, The Word List Learning test from the WMS-III. S-FNAME total summary, FN–N, and FN–O scores were found significantly correlated with performances in the learning ($r = .36$, $p < .001$; $r = .35$, $p < .001$; $r = .26$, $p = .005$, respectively), long-term memory

Table 4. S-FNAME scores after combining age by gender, calculated using bootstrapping (1,000 samples)

S-FNAME Scales and subtests	Age 50–65		Age >65	
	Men Mean (*SD*) (95% CI) Median (95% CI) *n* = 11	Women Mean (*SD*) (95% CI) Median (95% CI) *n* = 57	Men Mean (*SD*) (95% CI) Median (95% CI) *n* = 17	Women Mean (*SD*) (95% CI) Median (95% CI) *n* = 25
Subtests				
ILN	3.0 (0.6) (1.8–4.2) 3.0 (1.0–4.0)	5.6 (0.4) (4.8–6.5) 6.0 (4.0–7.0)	2.6 (0.6) (1.6–3.8) 2.0 (1.0–3.0)	3.2 (0.5) (2.4–4.1) 3.0 (2.0–4.0)
ILO	6.2 (0.7) (4.9–7.7) 6.0 (4.0–7.0)	9.0 (0.4) (8.2–9.8) 9.0 (8.0–10.0)	5.3 (0.7) (3.9–6.9) 5.5 (3.0–7.0)	6.0 (0.6) (4.9–7.1) 6.0 (5.0–7.0)
CRN	2.4 (0.6) (1.4–3.7) 2.0 (1.0–4.0)	4.5 (0.4) (3.8–5.2) 4.0 (3.0–5.5)	2.1 (0.6) (1.1–3.4) 1.5 (1.0–2.0)	2.4 (0.4) (1.7–3.2) 2.0 (1.0–3.0)
CRO	5.5 (0.7) (4.3–7.0) 6.0 (4.0–7.0)	8.7 (0.4) (7.9–9.5) 9.0 (8.0–10.0)	4.9 (0.8) (3.4–6.6) 4.5 (2.0–7.0)	5.2 (0.5) (4.1–6.2) 5.0 (4.0–6.5)
CRN30	2.2 (0.5) (1.2–3.3) 2.0 (1.0–3.0)	4.7 (0.4) (3.9–5.4) 5.0 (3.5–5.5)	1.9 (0.6) (0.9–3.4) 1.0 (0.5–2.0)	2.3 (0.4) (1.6–3.0) 2.0 (1.0–3.0)
CRO30	5.7 (0.7) (4.3–7.3) 6.0 (5.0–7.0)	8.3 (0.4) (7.4–9.1) 9.0 (7.0–10.0)	4.6 (0.8) (3.1–6.1) 4.0 (2.0–7.0)	5.0 (0.5) (4.1–6.0) 5.0 (4.0–6.0)
Scales				
FN–N	7.6 (1.6) (4.7–10.9) 8.0 (3.0–11.0)	14.7 (1.1) (12.4–17.0) 15.0 (12.0–18.0)	6.7 (1.7) (3.8–10.7) 4.5 (3.0–7.5)	8.0 (1.2) (5.8–10.2) 7.0 (6.0–8.5)
FN–O	17.4 (2.0) (13.9–22.0) 18.0 (13.0–20.0)	25.8 (1.2) (23.4–28.2) 27.0 (22.5–29.0)	14.8 (2.3) (10.5–19.3) 14.5 (7.0–22.0)	16.2 (1.6) (13.2–19.2) 16.0 (12.0–21.0)
Total	25.1 (3.1) (19.0–31.4) 24.0 (16.0–34.0)	40.8 (2.0) (36.8–44.8) 41.0 (33.0–46.0)	21.1 (3.2) (15.4–28.1) 18.0 (13.0–27.0)	24.2 (2.4) (19.9–28.7) 23.0 (20.0–27.0)

Note: S-FNAME = Spanish version of the Face Name Associative Memory Exam; ILN = initial learning for names; ILO = initial learning for occupations; CRN = immediate cued recall for names; CRO = immediate cued recall for occupations; CRN30 = delayed cued recall for names; CRO30 = delayed cued recall for occupations; FN–N = ILN + CRN + CRN30; FN–O = ILO + CRO + CRO30; Total = ILN + ILO + CRN + CRO + CRN30 + CRO30; *SD* = standard deviation; 95% CI = 95% confidence interval; *n* = number of subjects.

($r = .40$, $p < .001$; $r = .39$, $p < .001$; $r = .29$, $p = .002$, respectively), and recognition memory ($r = .24$, $p < .011$; $r = .18$, $p = .067$; $r = .24$, $p = .013$, respectively) of the Word List Learning test from the WMS-III. S-FNAME total summary scores were also significantly correlated with global cognitive performances (MMSE scores: $r = .34$, $p < .001$). The divergent validity analysis correlating the total S-FNAME scores with nonmemory tests did not show any statistically significant correlation.

Discussion

The FNAME is a complex face–name associative memory test, with ecological validity, that was shown to identify a population at risk of developing AD in its preclinical stage (Rentz et al., 2011). We are reporting psychometric and normative data of a S-FNAME in a sample of 110 cognitively normal Spanish-speaking subjects older than 49 years of age in central Barcelona.

With regard to construct validity of S-FNAME, the most reliable solution constituted two components: face–name and face–occupation. This finding is consistent with previous studies showing divergent performance on the association between face–name and face–occupation (Amariglio et al., 2012; McWeeny, Young, Hay, & Ellis, 1987; Rentz et al., 2011). Similar to previously published studies, face–occupation associations are easier to learn than face–name associations (Amariglio et al., 2012; James et al., 2008). Learning and recall of proper names are particularly difficult in older adults because names have a single association to the individuals they represent, whereas other types of words, such as occupations, have multiple associations to features of their meaning. Within the architecture of brain networks, when there is only one connection to transmit priming, a deficit in that connection will devastate activation, whereas when there are many networks through which priming is transmitted to a node, a deficit in any one connection is unlikely to be devastating because sufficient priming can summate from the other connections (James et al., 2008).

Convergent validity results reinforce that S-FNAME is measuring episodic memory. In the present study, the S-FNAME scores were correlated with another episodic memory test, the Word List Learning test from the WMS-III. Performances on the learning and long-term memory tests were significantly correlated not only with the S-FNAME total summary score but also with the FN–N and FN–O raw summary scales. These findings are similar to the original FNAME validation in which FNAME scores were highly correlated with another recognized test of episodic memory, the SRT (Amariglio et al., 2012). In our study, we found that total

S-FNAME and FN−N performances were highly correlated with performances in the learning and long-term memory of the Word List Learning test from the WMS-III ($r = .36$ and $.35$, $p < .001$, respectively); FN−O was also significantly correlated, but the values were low (learning: $r = .26$, $p = .005$; long-term memory: $r = .29$, $p = .012$); Amariglio and colleagues (2012) also found that FN−N and FN−O scores were significantly correlated with SRT scores, mainly the FN−N ($r = .54$ and $.42$, $p < .001$, respectively). In both cases, better FNAME scores were significantly correlated with better scores on another memory test (the Word List Learning test from the WMS-III and the SRT, respectively). Both measures have a learning stage where subjects are helped by the examiner repeating the words presented orally (in the Word List Learning test from the WMS-III) (Alegret et al., 2012) or providing a semantic feedback of the words showed in a A4 sheet (in the SRT) (Amariglio et al., 2012). Moreover, both measures have a free long-term memory recall, followed by a cued task where the examiner provides a list of 24 words (the 12 words of the list + 12 new words) and subjects are required to answer if that word had appeared in the initial list or not— recognition task in the WMS-III—or a semantic cue of the words that the subject did not recall in the SRT.

We estimated the effects of age, education, and gender on S-FNAME performance. Age and gender had a statistically significant effect on the S-FNAME, but not on education. Again, these findings are consistent with previous studies demonstrating that verbal learning and memory is affected by age (Alegret et al., 2012; Amariglio et al., 2012; Gómez-Pérez & Ostrosky-Solís, 2006; Lezak, Howieson, & Loring, 2004; Manubens et al., 2005; Norman, Evans, Miller, & Heaton, 2000; Peña-Casanova et al., 2009; Wechsler, 1997) and gender (Alegret et al., 2012; Lezak et al., 2004; Norman et al., 2000). The best S-FNAME scores were obtained by women of a younger age.

In contrast to other memory tests (Alegret et al., 2012; Ardila, Ostrosky-Solis, Rosselli, & Gómez, 2000; Lezak et al., 2004; Norman et al., 2000; Peña-Casanova et al., 2009), the original and the S-FNAME were not affected by education, as demonstrated previously with this type of face–name associative memory task (Werheid & Clare, 2007). The lack of association with education may be related to the fact that everyone commonly uses face–name–occupation associations in everyday life.

The interaction between age and gender was statistically significant. For this reason, we decided to show the data as a combination of both factors. Although some cells had reduced sample sizes, all the medians were comparable with their corresponding means, the data set of S-FNAME was normally distributed, both classifying by gender and age. Thus, the distributions of all the variables were symmetrical and all the parameters have been accurately estimated. Because all subscales were highly correlated between them, and total S-FNAME and FN−N scores were the most sensitive to episodic memory, we would suggest taking the total S-FNAME scores for clinical purposes.

In comparison with the FNAME validation study performed in the United States (Amariglio et al., 2012), the sample of the present study was younger and included a higher proportion of women. The reason for this is that we decided to include people from 50 years of age, similar to other Spanish normative studies, such as the NEURONORMA Project, that mainly reports the normative scores for the Rey–Osterrieth Complex Figure (Copy and Memory) and Free and Cued SRTs (Peña-Casanova et al., 2009), and we did not exclude any of the subjects that fulfilled inclusion criteria.

Our healthy older adults obtained lower performances than the American sample in the validation of the original FNAME (Amariglio et al., 2012), even though our sample was younger and with a higher proportion of women than the American sample. The participant pool was different. In the study by Amariglio and colleagues (2012), the subjects were cognitively normal controls recruited for a normal aging study, whereas the participants in this study were drawn from a memory clinic and most of them had subjective cognitive concerns about their memory. The clinical value of the S-FNAME is that it has potential for detecting early cognitive changes that may not be elicited using current neuropsychological tests. However, if someone has a diagnosis of MCI or AD, this test may be too difficult for them.

We cannot disregard that it could be due to some intrinsic differences between the versions of FNAME used (FNAME and S-FNAME) or the origin of the samples. The scores obtained in the present study appear very low for a healthy sample and it raises concern about S-FNAME's sensitivity/specificity for clinical samples when even healthy individuals perform so poorly. However, FNAME was created to detect preclinical AD (Rentz et al., 2011), and further longitudinal studies will be needed to determine whether lower performances will be related to an increased risk of conversion to cognitive impairment or dementia.

One of the limitations of the present study is on the sample size, mainly the reduced number of men. We included all cognitively normal participants on the OHI older than 49 years of age who fulfilled inclusion criteria for entering to the analysis, independent of their gender and educational level. As mentioned earlier, as a consequence of the sample size, confidence intervals of means and medians were calculated using bootstrapping. It is recognized that bootstrapping cannot generate information of a sample. But in fact, any statistical approximation cannot do that. Only sampling strategies can resolve that. The main property of the strategy is to provide information about the accuracy of the estimated parameters when small samples are used and, consequently, high biased estimations can be obtained as a consequence of the presence of potential exceptional observations. In these terms, bootstrapping is a well-considered approach.

The FNAME was created specifically for use in elderly individuals who were cognitively normal, although it could certainly be used in other contexts. It has the advantage of being complex, with ecological validity, and it can be completed in the context of a

single-day assessment within a neurobehavioral clinic. All of the subscales were highly correlated with each other; however, the total summary scores of the S-FNAME and the FN–N were the most sensitive to episodic memory. We would suggest that the total S-FNAME score should be used for clinical purposes.

However, future studies using clinical samples and neuroimaging will be needed to confirm that S-FNAME is sensitive to amyloid burden in cognitively normal Spanish speakers. Moreover, further validation studies will also be needed with other Spanish-speaking populations to determine if there are performance differences across Spanish speakers from Spain and other regions, such as South America, United States, or United Kingdom. Finally, longitudinal studies will be useful to determine whether lower S-FNAME scores in cognitively normal older adults are related to increased risk for future decline from normal to MCI to AD dementia.

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Conflict of Interest

None declared.

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