

The Memory Failures of Everyday (MFE) Test: Normative Data in Adults

Pedro Montejo Carrasco¹, Mercedes Montenegro Peña², and Manuel J. Sueiro²

¹Ayuntamiento de Madrid (Spain)

²Universidad Complutense (Spain)

One approach to the study of everyday memory failures is to use multiple-item questionnaires. The Memory Failures of Everyday (MFE) test is one of the most frequently used in Spain. Our objective is to provide normative data from the MFE in a sample of healthy, Spanish, adult participants for use in clinical practice. The sample consists of 647 employees at a large company ranging in age from 19-64 years-old. Everyday memory failures were evaluated by means of the MFE with the following response format: 0-2 (0 = never or rarely; 1 = occasionally, sometimes; 2 = frequently, often). Results: Mean MFE = 15.25 ($SD = 7.50$), range 0-40. Correlation with age: .133 ($p = .001$); and with years of education: -.059 (n.s.). A constant increase in MFE was not observed across age groups ($F = 4, 59; p = .003, \eta^2 = .02$), but differences were revealed between the 19-29 and 40-49 age groups; no differences were observed between the remaining age groups. Only slight differences between men and women occurred, the women's mean being slightly higher than the men's, but the confidence intervals overlapped ($F = 5, 71; p = .017, \eta^2 = .01$). These results indicate that age, years of education, and sex had no significant effects. In light of the above, the sample was viewed as a whole when computing the percentiles reported here.

Keywords: MFE, memory complaints, normative data, memory assessment, everyday memory failures.

Un modo de abordar el estudio de los fallos de memoria de la vida diaria es utilizar cuestionarios de múltiples ítems. Uno de los más utilizados en nuestro medio es el Cuestionario de Fallos de Memoria de la Vida Cotidiana (MFE). Nuestro objetivo es presentar datos normativos para población adulta española del MFE para su utilización en la práctica clínica. La muestra está formada por 647 sujetos (19-64 años), trabajadores de una gran empresa. Se han evaluado los olvidos cotidianos mediante el MFE con la valoración 0-2 (0 = nunca, raras veces; 1 = pocas veces, algunas veces; 2 = con frecuencia, muchas veces). Resultados: La media del MFE es 15.25 ($DT = 7.50$), rango 0-40; correlación con la edad = .133 ($p = .001$); con años de estudios: -.059 (n.s.). Entre los grupos de edad no se observa un incremento constante en MFE ($F = 4, 59; p = .003, \eta^2 = .02$), las diferencias se encuentran entre el grupo de 19-29 años y el de 40-49; no hay diferencias significativas entre las demás comparaciones. Respecto al sexo, hay pocas diferencias y los intervalos de confianza se solapan ($F = 5, 71; p = .017; \eta^2 = .01$). Concluimos que no hay variaciones importantes por edad, sexo ni años de estudios. Teniendo esto en cuenta se considera al grupo como un todo para obtener los percentiles que se presentan. *Palabras clave:* MFE, quejas de memoria, datos normativos, evaluación de memoria, olvidos cotidianos.

Correspondence concerning this article should be addressed to Pedro Montejo Carrasco. Centro de Prevención del Deterioro Cognitivo. Instituto de Salud Pública. Madrid Salud. Ayuntamiento de Madrid. C/ Montesa 22, Edificio B, 28006, Madrid. Phone: +34-915886789. Fax: +34-915886793. E-mail: montejop@madrid.es

The concept of everyday memory began in the 1980's to draw the distinction between memory as measured in the laboratory and memory as it is employed in daily life. The study of everyday memory is of crucial importance mainly for two reasons: first, to better understand memory and the more complex processes it involves and second, to promote our clinical understanding of subjects that suffer from memory disorders and help them with problems in their daily lives. Conferences held in the U.S. and Europe on the practical aspects of memory, together with an abundant body of literature (West & Sinnott, 1992), have promoted a theoretical perspective that conceives of memory as serving the individual's adaptation and survival in a given context. However, the low ecological validity of widely-used memory tests has drawn criticism, prompting the development of such tests as the Computerized Everyday Memory Battery by Larrabee and Crook (1988) and the Rivermead Behavioural Memory Test (Wilson, Cockburn, & Baddeley, 1985). These provide a regulated context in which to assess memory as it functions under normal circumstances, like remembering a first or last name, recognizing a face or remembering how to get somewhere.

Everyday memory has been studied from an objective point of view (objective memory), take the Rivermead Behavioural Memory Test for example, as well as subjectively, when subjects themselves or the people close to them evaluate memory failures arising in daily life. Memory failures expressed by subjects, bearing in mind that they are a manifestation of the subjective perception and experience of one's memory performance, are frequently called memory complaints. Several diagnoses related to impairment in memory, or cognition in general, include memory complaints among their criteria (Crook et al., 1986; Petersen et al., 1999).

Evaluations of everyday memory and memory complaints yield different results depending on the mode of assessment. Often, the high or low prevalence of memory complaints and their relationship with cognitive impairment or depression can be explained by the method of assessment utilized, how subjects with memory complaints are selected, and the environment in which the assessment is carried out. For example, selecting a sample in which a considerable percentage of subjects suffer from depression or dementia (Blazer, Hays, Fillebaum, & Gold, 1997) would affect the prevalence of memory complaints. On the other hand, population studies (Montejo, Montenegro, Fernández, & Maestu, 2011), studies conducted through telephone interview (Crooks, Buckwalter, Petitti, Brody, & Yep, 2005), and studies carried out in clinical settings may produce very different results and reveal different associations (Barker, Jones, & Jennison, 1995). Memory complaints are normally assessed in one of two ways: through one or very few questions, or by questionnaire. These methods are correlated but not equivalent (Abdulrab & Heun, 2008).

Questionnaires evaluate the frequency and seriousness

of everyday memory failures as well as other factors related to metamemory. Frequency questionnaires present lists of everyday memory failures and subjects are asked to indicate how frequently they experience each one on the scale provided. Other questionnaires assess memory failures' severity, the strategies used to resolve them, the influence of individual self-perception, the effort involved, the predictions we make about memory failures, etc. Some authors have provided data about these instruments' variability and respective strengths (Gilewski & Zelinski, 1986; Pérez, Godoy, Vera, Laserna, & Puente, 1998). Among the most widely utilized are: the Metamemory Questionnaire (Zelinski, Gilewski, & Thompson, 1980), the Metamemory in Adulthood Questionnaire by Dixon and Hultsch (1983), and the Memory Failures of Everyday (MFE) test (Sunderland, Harris, & Baddeley, 1983). In Spain, we also have the *Autoinforme de Memoria para Ancianos (AMA)* (the Geriatric Self-rated Memory scale) (Fernández Ballesteros, Izal, Montorio, González, & Díaz, 1992) and the *Cuestionario de Olvidos Cotidianos* (Everyday Memory Failures Questionnaire) by Benedet and Seisdedos (1996), which is the Spanish-language version of the *Questionnaire d'auto-évaluation de la Mémoire* (Van der Linden, Wijns, Von Frenkell, Coyette, & Seron, 1989).

The MFE questionnaire evaluates memory forgetfulness; it assesses memory failures in daily life such as "forgetting where you have put something, losing things at home," "forgetting when something happened," and "having a word on the tip of one's tongue," among others. Some are not direct memory failures of daily life, but result from memory impairment, for example: "losing the thread of a conversation" and "getting lost or going in the wrong direction during a trip." It covers the categories "speaking, reading, and writing," "names and faces," "actions," and "learning new things." Created by Sunderland et al. (1983), it includes 35 items about memory failures, the presence or absence of which is evaluated on a 5-point Likert-type scale. This assessment takes into account the frequency with which memory failures occur, from "always" or "several times a day" to "never." It was administered to two groups of individuals 16 to 65 years of age who had acquired brain injury resulting in posttraumatic amnesia of at least 24 hours, in addition to a control group; the same questionnaire was also administered to participants' relatives. They all received a list of memory failures and were asked to determine, at home, every day for 7 days, what memory failures they experienced that day and how frequently. This first version of the questionnaire was later modified to create a 28-item version (Sunderland, Harris, & Gleave, 1984) made up of 22 of the old items and 6 new ones. That second version is among the questionnaires most often utilized to measure daily failures and will be employed in the present study. It presents 9 response options ranging from "Never in the last 3 months" to "More than once a day." Other authors (Royle & Lincoln, 2008) have used the

28-item version with 5 response alternatives and studied its factor structure and internal consistency, later developing a 13-item version. The 28-item version has also been employed with 7 response options (Tinson & Lincoln, 1987) and in a different study, with 4 (Efklides et al., 2002). Another study, conducted in children, used two versions with a different number of items and response options (Drysdale, Shores, & Levick, 2004).

The MFE has been used to determine everyday functioning in cases of: acquired brain injury, primarily in rehabilitation tasks (Wilson, 1987; MacKinley & Hickox, 1988; Quemada et al., 2003), dementia (Seltzer, Vasterling, Hale, & Khurana, 1995), multiple sclerosis (Richardson, 1996), epilepsy (Goldstein & Polkey, 1992), to study memory in children without impairment as well as with learning disorders (Drysdale et al., 2004), to study subjective memory in elderly adults (Sunderland, Watts, Baddeley, & Harris, 1986), to determine the results of memory training in the elderly (Cavallini, Pagnin, & Vecchi, 2003; Montejo, Montenegro, Reinoso, de Andrés, & Claver, 1999), and to assess the memory failures of tobacco smokers compared to non-smokers (Heffernan et al., 2005).

Numerous studies have used the MFE to compare data across different age groups. In one study, García Martínez and Sánchez-Cánovas (1993) discovered significant differences between young people (all students administered the test collectively) and elderly adults (recruited at senior centers). Young people scored lower than the elderly on a global test and on the majority of items. Studies by Sunderland et al. (1986), however, have indicated the opposite: young people score higher. Richardson (1996), in subjects between 32 and 73 years-old, found no age differences in memory failures of everyday life, although elderly adults expressed more memory complaints. These diverse studies have found sex and level of education to have no effect (Sunderland et al., 1984).

We believe the MFE is a useful instrument to study everyday memory failures. In both clinical settings and the field of cognitive stimulation, subjective assessment of everyday memory is of critical importance, and normative data is needed to allow for its interpretation. We conducted this research because, that we know of, no published study has provided normative data for a Spanish population using this version of the MFE.

The present study's objective is to generate and present normative data for use in clinical practice from a young adult, Spanish population, on the Memory Failures of Everyday Questionnaire, the MFE, using the version with three response options.

Method

Participants

The sample is comprised of 647 subjects, mean age: 40.08 ($SD = 10.03$) years, age range: 19 to 64 years (26.9% male). All are employees at a service-providing company and come from all of its various levels, from receptionists and administrative personnel to high-level technicians. All are actively employed and interested in the subject of memory. The tests and assessments were carried out by professional psychologists and psychiatrists. Subjects were only accepted into the study if they had no neurological or psychiatric pathology that could have compromised our results. The professionals who administered the tests utilized clinical observation to rule out any such pathology; additionally, the Goldberg Depression and Anxiety Scale was administered for that purpose (Goldberg, Bridges, Duncan-Jones, & Grayson, 1988). Considering this whole process took place in a workplace setting, it was important for us to comply with the rules of personal data protection at all times. Completed forms could only be identified by means of a key created by the subject, and only known to him or her. The sample's characteristics appear in Table 1.

The subjective evaluation of memory was carried out using the Memory Failures of Everyday (MFE) questionnaire by Sunderland et al. (1984), which includes 28 items about everyday situations and activities. Scores are presented on a 3-point scale (0= never, rarely; 1= occasionally, sometimes; 2= frequently, often). We utilized the Spanish language version that appears in Baddeley's work (1990). The MFE was administered along with other neuropsychological tests in the context of a broader assessment, prior to various educational sessions about health provided by the company; participants attended these voluntarily with no incentive of any kind. This test is a self-report measure and is administered to groups of 15 participants at a time. We opted

Table 1
Age and Education Descriptive Data

Characteristics: $N = 647$					
Age	N	%	Education	N	%
19-29	115	17.8	Primary School	37	5.7
30-39	179	27.7	High School	109	16.9
40-49	237	36.6	Bachelor's Studies	207	32.0
50-64	116	17.9	Master's Studies	294	45.4

for the version with three response categories because it is the most widely utilized in the Spanish language in several contexts, in research studies and clinical practice alike (Montejo, Montenegro, Reinoso, de Andrés, & Claver, 2006; Delgado, Fernández, & González, 2009; Landa, 2007; Quirosa & López, 2009; Garamendi, Delgado, & Amaya 2010; Requena, López, & Ortiz, 2009).

The anxiety and depression assessment was conducted by means of the Goldberg Anxiety and Depression Scale (Goldberg, Bridges, Duncan-Jones, & Grayson, 1988), which was conceived of to detect the two most common psychopathologies. It consists of 18 questions to separately assess anxiety and depression; the cut-off points for having anxiety and depression, respectively, are 3/4 and 1/2. The reliability and validity of the Spanish version of this measure have been demonstrated in the context of Primary Care; its sensitivity (83.1%), specificity (81.8%), and positive predictive value (95.3%) have been shown to be adequate (Montón Franco, Pérez Echevarría, Campos, García Campayo, & Lobo, 1993). In the current research, this test was employed merely as an element to guide the professionals' decisions. 14 subjects were excluded for various reasons (total $n = 661$).

Statistical Analysis

SPSS version 15 was used to complete the statistical analysis. The sum of all item scores on the MFE was considered the dependent variable. To examine correlations among the quantitative variables (MFE with years of age and years of education), the Pearson "r" was utilized, while the variable categorized age was analyzed using Spearman's "r." To study the effects of factors like sex and age, sub-divided

into groups, an ANOVA was applied, and for subsequent between-groups comparisons, we used the Bonferroni statistic. For that analysis of variance, the conditions of normal distribution and homocedasticity were met. Levene's test of equality of variances yielded values of, for the MFE using age groups, $F = .885$; $p > .05$; and for the MFE using sex, $F = .632$; $p > .05$. Effect size was computed using η^2 .

Results

The mean MFE score was 15.25 ($SD = 7.50$). The instrument's reliability was analyzed: Cronbach's alpha = .871; Gutman's split-half reliability = .870. Displayed in Table 2 are means, standard deviations (SD), the correlations between demographic variables and MFE scores, and the aforementioned ANOVA.

A significant correlation was observed with age, both as a continuous measure (Pearson's $r = .130$) and by category (Spearman's $r = .142$), but the percentage of variance in MFE scores explained by age in neither case surpassed 2% (in both cases, $\eta^2 = .02$). Similarly, the analysis of variance revealed statistically significant differences as a function of age group ($F = 4, 75$; $p = .003$). In addition, the Bonferroni correction indicated differences occurred between the 19-29 and 40-49 age groups; the remaining comparisons showed no statistically significant differences. There are significant differences for sex, but their effect size was very small ($\eta^2 = .01$); though women exhibited higher average MFE scores, the differences were slight and the confidence intervals overlapped. The correlation between MFE scores and years of education did not turn out to be significant ($r = -.059$).

Table 2
Descriptive data, Correlations with MFE Scores, and ANOVA

Variables (range)	Mean	Stand. dev.	Correlation with MFE (Pearson r)	
Years of Age	40.08	10.03	0.133 ($p = .001$)	
Years of Education	17.90	4.29	-0.059 (n.s.)	
ANOVA				
	Mean MFE	Stand. Err.	Confidence Interval 95%	
			Lower Limit	Upper Limit
Age Groups ($F = 4, 75$; $p = .003$, $\eta^2 = 0.02$)				
19-29 years	13.60	0.70	12.23	14.98
30-39 years	14.37	0.56	13.27	15.46
40-49 years	16.30	0.49	15.35	17.25
50-64 years	16.10	0.69	14.74	17.47
Sex ($F = 5, 71$; $p = .017$, $\eta^2 = 0.01$)				
Men	13.72	0.62	12.50	14.94
Women	15.45	0.38	14.71	16.20

Table 3
MFE Percentiles for Subjects 19 to 64 Years-old

MFE (0-2)	
Statistics	Scores
Mean	15.25
<i>SD</i>	7.50
Percentiles	
1	2.00
5	5.00
10	7.00
15	8.00
20	9.00
25	10.00
30	10.00
35	11.00
40	12.00
45	13.00
50	14.00
55	15.00
60	16.00
65	17.00
70	18.00
75	19.00
80	21.00
85	23.00
90	26.00
95	30.00
99	37.00

The data collected indicate no important variations occurred in our sample of subjects 19-64 years-old according to age, sex, or level of education. With that in mind, the group was considered in its entirety when computing percentiles, as conveyed in Table 3.

Discussion

Here we present normative data from a broad sample of subjects 19 to 64 years of age. The data pertain to working-age subjects who are actively employed. They come from all educational levels and professional categories. All came in for an assessment due to their interest in subjects related to memory, which may be considered one limitation of this study. They are the kind of people that can go to a consultation about memory complaints.

The potential stratifications most frequently studied in normative data research are age group, level or years of education, and sex. The link between age, level of education, and sex with everyday memory failures has mostly been investigated using memory complaints questions. Age differences surface when young people or middle-aged

adults are compared with elderly adults, but those differences by age group are inconsistent and do not manifest themselves when only young people and adults are studied, and not compared to the elderly. Basset and Folstein (1993) carried out a population study of individuals 18 to 92 years-old and found that the differences among people under 65 were not significant, but the differences were indeed significant between participants under and over 65. A study of subjects aged 39 to 89 years-old indicated there is no link between age and total number of memory failures, but rather between age and memory failures in different situations (Bolla, Lindgren, Bonaccorsy, & Bleecker, 1991). A memory complaints study by Ponds, Commissaris and Jolles (1997) of subjects between 24 and 86 years-old found no association with sex or education. However, they did reveal an association with depression and age such that complaints increased consistently with age, although significant differences were not observed between 25 and 50 years-old. In a study by Mendes et al., (2008), a memory failures questionnaire was administered (Subjective Memory Complaints) (Schmand, Jonker, Hooijer, & Lindeboom, 1996), revealing that the only variable to predict memory complaints was depression, and that there was no association with age (18-87 years), sex, or education. Nevertheless, an association between level of education and memory complaints has on other studies been observed in the elderly (Montejo, Montenegro, Fernández, & Maestú, 2011). The two articles mentioned in the introduction (Sunderland et al., 1984; García et al., 1993) were conducted using the MFE and subjects of different age groups. They compared young people with elderly adults, but not young people and adults. From the explanations given in this paragraph, one may deduce that a great deal of controversy surrounds the subject of age and everyday memory failures, or their manifestation as memory complaints. We can say, however, that the various research studies conducted in youths have either found no association or have found a very weak one. Meanwhile, in the elderly, a more consistent association is reported, probably due to other age-related factors like "age-associated memory impairment," "mild cognitive impairment," poor quality of life, low perception of one's health status, alterations in mood, and objective memory impairment. In reality, the association between memory failures and age would not be primary; rather, it would occur indirectly through these other factors (Montejo, Montenegro, Fernández, & Maestú, 2012).

In our sample, we observed that the variables age, years of education, and sex either had no effect (in the case of education) or had a very minor effect (in the case of age group and sex). The proportion of total variance explained by age and sex was very small. For these reasons, our decision was to create only one table of normative data.

The MFE has been utilized in normal subjects and those with a range of pathologies, and has been administered to

target subjects directly as well as to their relatives. Currently, there is growing interest in mental stimulation in general and memory training in particular, both in popular science (web sites, interactive cell phone games, consoles, etc.) and the clinical sector (literature review studies, computerized stimulation programs, research with several types of patients including those with Alzheimer-type Dementia, Mild Cognitive Impairment, and normal adults, memory improvement courses, etc.). The MFE is useful and research has confirmed its efficacy at cross-sectional assessment, evaluating memory failures' evolution over time, subjective assessment after a follow-up period or intervention, and its sensitivity to changes (Montejo et al., 1999).

In the present study, we chose to employ the three-response option assessment because it is the most widely used in the study of memory complaints, to which the articles cited in the subjects and methods section can attest. Moreover, because the MFE can be used by people young and old, with and without cognitive impairment, this simple, clear, and uncomplicated mode of assessment can be applied to a broad range of potential users, allowing for comparisons among them.

Future research using this instrument should include studies of samples over 65 years-old in which memory failures could be linked to cognitive impairment. Furthermore, the link between MFE scores and other variables should be examined, particularly anxiety, depression, and objective memory performance.

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