

Relations between memory complaints, depressive symptoms and cognitive performance among community dwelling elderly

Relações entre queixas de memória, sintomas depressivos e desempenho cognitivo em idosos residentes na comunidade

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Abstract

Background: Memory complaints are quite common among the elderly; yet, the clinical relevance of these complaints to diagnose cognitive decline is debatable, since several different factors could be associated with them. **Objective:** The present paper examined the correlations between memory complaints, depressive symptoms and cognitive performance in a group of 301 elderly individuals who lived in the district of Ermelino Matarazzo, São Paulo, and who participated in the population-based survey entitled Profiles of Frailty in Elderly Brazilians by the FIBRA Network. **Methods:** Cognitive performance was assessed with the memorization test involving 10 common pictures, the Mini Mental State Examination (MMSE), the Verbal Fluency (VF) test, and the Clock Drawing Test, which comprise the Brief Cognitive Screening Battery (BCSB). Memory complaints were assessed with the Memory Complaint Questionnaire (MAC-Q), and depressive symptoms with the Geriatric Depression Scale (GDS). **Results:** Female participants had higher rates of memory complaints when compared to male participants ($p = 0.013$). Subjects with less years of schooling had more severe memory complaints and poorer cognitive performance than those with more years of schooling ($p < 0.003$). The presence of depressive symptoms was associated with poorer memory assessment scores ($r = 0.39$, $p < 0.001$). **Discussion:** Memory complaints were correlated with sex, schooling and depressive symptoms among elderly individuals residing in the community. No correlation was found between complaints and cognitive performance.

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Keywords: Older adults, elderly, memory, depressive symptoms, memory complaints.

Resumo

Contexto: A queixa de memória é comum entre pessoas idosas, entretanto sua relevância clínica para o diagnóstico de alterações cognitivas é questionável, visto que diversos fatores podem se associar às queixas. **Objetivo:** O presente estudo avaliou a relação entre queixas de memória, sintomas depressivos e desempenho cognitivo em 301 idosos residentes em Ermelino Matarazzo que participaram da pesquisa de base populacional Perfis de Fragilidade em Idosos Brasileiros da Rede FIBRA. **Métodos:** O desempenho cognitivo foi avaliado por meio dos testes de memorização de 10 figuras comuns, Miniexame do Estado Mental (MEEM), Fluência Verbal (FV) e Teste do Desenho do Relógio, que compõem a Bateria Breve de Rastreio Cognitivo (BBRC). As queixas de memória foram avaliadas pelo Questionário de Queixas de Memória (MAC-Q) e os sintomas depressivos, pela Escala de Depressão Geriátrica (EDG). **Resultados:** Participantes do sexo feminino apresentaram maior índice de queixas de memória, comparado aos homens ($p = 0,013$). Idosos menos escolarizados apresentaram queixas de memória mais intensas e pior desempenho cognitivo, comparados aos de maior escolaridade ($p < 0,003$). A presença de sintomas depressivos associou-se a pior avaliação da memória ($r = 0,39$, $p < 0,001$). **Conclusão:** As queixas de memória se associaram a sexo, escolaridade e sintomas depressivos, entre idosos residentes na comunidade. Não houve associação entre queixas e desempenho cognitivo.

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Palavras-chave: Idoso, memória, sintomas depressivos, queixas de memória.

Introduction

The concept of metamemory refers to a set of beliefs, affects and knowledge that an individual can have on the functioning of memory. It also includes the construct of self-efficacy for memory tasks, which concerns an individual's assessment of his or her own ability to perform a given task that involves memorization. Individuals with a more positive set of beliefs are expected to perform better on memory tests¹⁻⁴, because those variables can affect their engagement in these tasks.

Memory complaints and concerns are also regarded as part of the construct of metamemory, or still, as part of the concept of subjective

memory. Memory complaints are present in the general population, but their prevalence tends to increase with age^{5,6}, and studies have been conducted to examine the clinical value of these complaints among the elderly^{7,8}.

International criteria for the detection of cognitive decline among elderly individuals include memory complaints as a key parameter, for instance, to diagnose Mild Cognitive Impairment (MCI)^{9,10}. In order to detect MCI, the person or his/her caregiver must notice cognitive changes and report it to the physician. However, these complaints are not always predictive of cognitive decline or dementia. Earlier studies have suggested that cognitive complaints might reflect

the emotional state of the patient¹¹, as depression and anxiety symptoms could intensify memory complaints¹². Yet, memory complaints always justify clinical investigation¹³.

Some research studies conducted with elderly individuals in the community did not find significant correlations among memory complaints, age and cognitive performance^{14,15}. According to Xavier *et al.*¹⁵, complaints were more closely related to depressive symptoms than to objective changes in memory. Nevertheless, data from a longitudinal research study¹⁶ involving 2,802 elderly individuals suggested that complaints accurately predicted the observed decline in memory performance over five years.

It is plausible that participants' level of schooling affects the clinical value of cognitive complaints. Earlier research has shown that among people with higher education these complaints might be an important indicator of impending Alzheimer's disease (AD)¹⁷⁻²¹. In a nine-year longitudinal study, Van Oijen *et al.*¹⁷ demonstrated that among seniors with higher educational levels, even when they achieved normal results on cognitive tests, complaints were predictive of AD. Clinical studies have also suggested that complaints could be of better predictive value for dementia among highly educated individuals, even when no cognitive impairment is observed in brief tests^{18,19}.

Other studies suggested that the cognitive status of participants possibly modulates the clinical value of complaints. Schofield *et al.*²² documented that 31% of normal aged individuals and 47% of aged individuals with cognitive impairment had memory complaints. Cook and Marsiske²³ compared 57 healthy elderly subjects with 16 who had MCI, all highly educated, and found that memory complaints were significantly correlated with verbal memory performance among subjects with MCI but not among healthy subjects.

In summary, research studies point to the clinical value of memory complaints in aging, though they differ as to the likelihood of complaints being associated with poorer cognition or predicting dementia syndromes. Population-based studies can provide valuable information because they tend to be less biased than clinical studies. The objective of the present paper was to examine the relationship between memory complaints, sociodemographic variables, number of depressive symptoms and cognitive performance among elderly subjects residing in the district of Ermelino Matarazzo, São Paulo.

Methods

Participants

The present research study was carried out using data from a survey conducted by the FIBRA Network, led by Unicamp, entitled "Profiles of Frailty among Elderly Brazilians". The purpose of that survey was to investigate various profiles of frailty and the factors associated with this syndrome. The School of Arts, Sciences and Humanities at the University of São Paulo partnered with Unicamp for the FIBRA Network project. Between July, 2008 and June, 2009, 384 elderly individuals who lived in Ermelino Matarazzo, a district located in eastern São Paulo metropolitan area, were surveyed. Further details on the methods used by the FIBRA Network, Unicamp, can be found in Neri *et al.*²⁴.

Procedures

The FIBRA Network total sample was drawn according to a random selection of census tracts corresponding to the urban area of each of the participating locations. For areas with less than 1 million inhabitants, as is the case of Ermelino Matarazzo, the estimated sample size was 385, for a 5% sampling error. Recruiters were trained to check the following inclusion criteria: being 65 years old or older, understanding instructions, agreeing to participate, and being a permanent resident in the household and in the census tract. Exclusion criteria were: 1. having severe cognitive impairment suggestive of dementia, as observed by recruiters; 2. being in a wheelchair or bedridden; 3. having serious sequelae from stroke, with localized loss of strength

and/or aphasia; 4. Parkinson's disease in a severe or unstable stage; 5. having hearing or vision impairment that hinders communication; 6. end-stage disease. Elderly individuals who met inclusion criteria were invited to undergo an evaluation at a community center. Inclusion and exclusion criteria were verified through a brief, structured interview with the elderly person or with a family member as well as by means of observation during the home visit. Recruiters were community-based healthcare agents or college students who were trained to perform the recruitment procedures.

In the data collection session, after signing an Informed Consent Form, participants completed the Mini Mental State Examination (MMSE)²⁵. Those who scored below the cutoff point for their level of education completed sociodemographic, anthropometric, blood pressure and frailty profile data and were then dismissed. Subjects who scored above the cutoff point on the MMSE completed psychological, social and health-related questionnaires. MMSE cutoff points were adjusted according to the participant's level of education, namely, 17 points for the illiterate, 22 points for those with 1-4 years of schooling, 24 points for 5-8 years, and 26 points for 9 or more years of schooling. These cutoff points are the means presented by Brucki *et al.*²⁵ for each level of schooling minus one standard deviation. Present analyses included 301 participants, as the Geriatric Depression Scale (GDS) was applied only to participants with MMSE scores above the cutoff point. Furthermore, the inclusion of participants with preserved cognition aimed at ensuring reliability of the answers in self-reported questionnaires. It is estimated that this reduction in sample size generated a modest increase in sampling error, from 5 to 5.7%.

Ethical aspects

The present research study was approved by the Ethics Committee at the School of Medical Sciences from the State University of Campinas, protocol number 208/2007.

Materials

Research protocol included sociodemographic data such as age, income, years of schooling and marital status. Depressive symptoms were assessed with the GDS, with 15 questions²⁶.

In order to examine memory complaints, the Memory Complaint Questionnaire (MAC-Q)^{13,27} was applied. Respondents were asked if their performance today was the same, better, much better, worse or much worse than it was when they were 18 years old in six memory domains. The maximum score is 35 points and higher scores indicate higher presence of memory complaints. Score above 25 on this instrument is considered suggestive of the presence of significant memory complaints. In the FIBRA survey, conducted in Ermelino Matarazzo, the person was asked to compare their current performance with his/her performance 10 years ago.

The Brief Cognitive Screening Battery^{28,29} was used to assess cognitive performance. It encompasses the identification of 10 common pictures (naming) and immediate recollection (incidental recall). Subsequently, the pictures are presented again and the subject is asked to memorize them for 30 seconds and then recall them (immediate recall). This procedure is repeated one more time (learning). Next, subjects completed the Verbal Fluency test (VF), animal category, and the Clock Drawing Test (CDT). After completing the latter, subjects were asked to recall the pictures presented earlier (delayed recall). Finally, those 10 pictures were presented alongside 10 distracting pictures, and the participant had to recognize the ones originally presented (recognition).

Data analysis

The Kolmogorov-Smirnov test indicated that most continuous variables did not follow normal distribution, thus, non-parametric tests were used. In order to compare continuous variables between

two or among three groups, the Mann-Whitney U-test and the Kruskal-Wallis test were used, respectively. The Kruskal-Wallis test, with *p-value* < 0.05, was followed by the multiple comparison test (Multiple Comparison Z-value test). Spearman correlation analyses were then conducted.

Linear regression analysis, univariate and multivariate with Stepwise Forward variable selection, were used to examine the correlations between the sociodemographic and psychological variables (GDS, MAC-Q) with the dependent variables (cognitive test scores), from simpler to more complex models. Variables with *p* < 0.10 in the univariate regression analysis were included in the final multiple models³⁰. The significance level for statistical tests was 5%, or *p-value* < 0.05.

Results

The sample (N = 301) included a majority of women (66.57%), of individuals within the 65-74 age group (38.44%), of those who were married or in a stable relationship (49.58%), and of subjects who completed elementary school (62.67%). Seventeen point twenty-seven percent of surveyed subjects reported being illiterate. As for family income, 40.11% reported to receive up to one minimum wage and 42.63% one to three minimum wages per month.

Table 1 presents mean scores for the sample: MMSE, 23.9 (SD ± 3.51); VF, 11.90 (SD ± 3.51); MAC-Q, 25.26 (SD ± 4.63); and GDS 3.42 (SD ± 2.60) (Table 1).

Men scored higher in incidental and immediate recall. Men also had lower rates of memory complaints and reported fewer depressive symptoms (Table 2). Participants aged 65-69 scored better in all cognitive tests. In the MAC-Q and GDS, no statistical differences were found among age groups, as shown in table 3.

When the sample was divided into different levels of schooling, illiterate elderly had poorer cognitive performance, as well as higher rates of memory complaints and depressive symptoms, when compared to more educated subjects (Table 4).

When the sample was divided into individuals with six or more depressive symptoms *versus* individuals with less than six, it was noted that seniors with a greater number of depressive symptoms had a higher rate of memory complaints (less than six symptoms, average MAC-Q score of 24.71 and SD ± 4.18; six or more symptoms, average MAC-Q score of 27.45 and SD ± 4.97; *p-value* < 0.001). Individuals with six or more depressive symptoms had poorer performance in incidental and delayed recall as well as in verbal fluency (these data are not shown in tables).

When the sample was divided into terciles according to MAC-Q distribution, it was found that subjects with MAC-Q scores above 28 had poorer performances in verbal fluency (M = 11.34, SD ± 3.39) than those with scores between 8 and 23 (M = 12.36, SD ± 3.44) and those with scores between 24 and 27 (M = 12.09, SD ± 3.61) (*p-value* = 0.030).

Multivariate regression analysis (see table 5) indicated that cognitive variables were affected by level of schooling, age, income and depressive symptomatology. Performance in immediate and incidental recall was also affected by sex. Cognitive variables were not affected by the presence of memory complaints as measured by the MAC-Q.

Table 1. Sample characteristics, cognitive and socio-demographic variables (n = 301)

Variable	Means	SD±	Median
Age	72.16	5.65	71.00
Years of schooling	3.42	2.82	4.00
Family income (MW)	3.40	3.09	2.48
MMSE	23.90	3.56	24.00
Naming	9.70	1.21	10.00
Incidental recall	5.66	1.47	6.00
Immediate recall	7.57	1.59	8.00
Learning	8.25	1.61	8.00
Verbal fluency	11.90	3.51	12.00
Clock drawing test	2.52	1.69	3.00
Delayed recall	7.49	1.97	8.00
Recognition	9.39	1.08	10.00
MAC-Q	25.26	4.63	25.00
GDS	3.42	2.60	3.00

MW: minimum wage; MAC-Q: Memory Complaint Questionnaire; GDS: Geriatric Depression Scale.

Table 2. Means and standard deviation of the examined variables for men and women (n = 301)

	Men		Women		p-value
	Means	SD±	Means	SD±	
Naming	9.56	1.57	9.77	0.98	0.275
Incidental recall	5.37	1.41	5.80	1.48	0.017
Immediate recall	7.21	1.70	7.75	1.50	0.003
Learning	8.12	1.58	8.32	1.62	0.177
Verbal fluency	11.76	3.40	11.97	3.56	0.717
Clock drawing test	2.71	1.75	2.42	1.66	0.114
Delayed recall	7.38	1.83	7.54	2.04	0.183
Recognition	9.40	1.05	9.38	1.10	0.801
MAC-Q	24.38	4.38	25.71	4.70	0.013
GDS	2.82	2.30	3.68	2.70	0.006

MAC-Q: Memory Complaint Questionnaire; GDS: Geriatric Depression Scale.

Table 3. Means and standard deviation of the examined variables for elderly subjects in different age groups (n = 301)

Variable	Age groups								p-value
	65-69		70-74		75-79		80 or +		
	Means	SD±	Means	SD±	Means	SD±	Means	SD±	
Naming	9.94	0.34	9.56	1.46	9.65	1.36	9.36	1.83	0.002 ^a
Incidental recall	6.07	1.30	5.58	1.46	5.44	1.32	4.81	1.81	< 0.001 ^{b,c}
Immediate recall	8.10	1.19	7.43	1.56	7.40	1.70	6.45	1.93	< 0.001 ^{b,c,d,e}
Learning	8.72	1.07	8.17	1.71	8.08	1.56	7.17	2.21	< 0.001 ^{c,e}
Verbal fluency	12.71	3.41	11.70	3.42	11.43	3.29	10.48	3.81	0.003 ^c
Clock drawing test	2.82	1.62	2.55	1.71	2.22	1.67	1.90	1.72	0.007 ^c
Delayed recall	8.12	1.43	7.52	1.87	7.11	1.88	5.88	2.79	< 0.001 ^{b,c,e}
Recognition	9.67	0.67	9.32	1.28	9.30	0.87	8.76	1.49	< 0.001 ^{b,c}
MAC-Q	25.07	4.11	25.19	5.03	26.06	4.84	24.90	4.84	0.618
GDS	3.19	2.54	3.43	2.75	3.40	2.28	3.93	2.84	0.560

a: there is no statistically significant difference when using the multiple comparison test; b: 65-69 =75-79; c: 65-69 =80 or +; d: 65-69 =70-74; e: 70-74=80 or +. MMSE: Mini Mental State Examination; MAC-Q: Memory Complaint Questionnaire; GDS: Geriatric Depression Scale.

Table 4. Means and standard deviation of the examined variables according to level of schooling (n = 301)

	Illiterate		1 to 4 years		5 years or +		p-value
	Means	SD±	Means	SD±	Means	SD±	
Naming	9.20	2.00	9.80	0.98	9.81	0.85	< 0.001 ^a
Incidental recall	5.38	1.85	5.71	1.37	5.74	1.41	0.460
Immediate recall	7.15	1.85	7.61	1.59	7.81	1.23	0.137
Learning	7.70	1.99	8.28	1.55	8.60	1.31	0.020 ^b
Verbal fluency	10.26	3.70	12.01	3.35	12.94	3.38	< 0.001 ^{b,c}
Clock drawing test	1.34	1.55	2.69	1.61	2.97	1.64	< 0.001 ^{b,c}
Delayed recall	6.89	2.67	7.58	1.78	7.71	1.77	0.323
Recognition	9.08	1.16	9.43	1.07	9.51	1.01	0.015 ^a
MAC-Q	26.58	5.65	25.20	4.35	24.38	4.35	0.003 ^c
GDS	4.43	2.71	3.23	2.44	2.79	2.77	0.001 ^b

a: there is no statistically significant difference when using the multiple comparison test; b: Illiterate=5 years or more; c: Illiterate=1 to 4 years. MAC-Q: Memory Complaint Questionnaire; GDS: Geriatric Depression Scale.

Table 5. Multiple linear regression analyses with sex, age, schooling, income, MAC-Q and GDS as independent variables and cognitive tests as dependent variables (n = 298)

Performance	Independent variables	B	Standard error	p-value
Naming	Schooling	0.034	0.016	0.039
Incidental recall	Age	-0.050	0.015	0.001
	Sex	0.512	0.168	0.002
	GDS	-0.057	0.031	0.066
Immediate recall	Age	-0.063	0.015	< 0.001
	Sex	0.616	0.162	< 0.001
	GDS	-0.056	0.030	0.064
Learning	Age	-0.078	0.015	< 0.001
	Schooling	0.284	0.077	< 0.001
	Age	-0.126	0.037	0.001
Verbal fluency	Age	-0.126	0.037	0.001
	GDS	-0.205	0.075	0.007
	Schooling	0.220	0.036	< 0.001
CDT	Age	-0.029	0.018	0.098
	Schooling	0.220	0.036	< 0.001
Delayed recall	Age	-0.111	0.019	< 0.001
Recognition	Age	-0.028	0.009	0.003
	Schooling	0.045	0.019	0.017

Variable selection criterion: Stepwise Forward (p < 0.10); variable gender is dichotomic (0 = male and 1 = female). MMSE: Mini Mental State Examination; CDT: Clock Drawing Test; MAC-Q: Memory Complaint Questionnaire; GDS: Geriatric Depression Scale.

Discussion

Memory complaints relate to one's subjective memory, and are associated with beliefs, feelings and perceptions about one's own cognitive performance. They are part of a larger construct called metamemory³¹. The present paper sought to examine the relationship between memory complaints assessed with the MAC-Q, sociodemographic variables, depressive symptoms and cognitive performance among elderly individuals who live in Ermelino Matarazzo, São Paulo. Results suggested that there is a heightened perception of memory decline among women, among less educated participants and among those with greater presence of depressive symptomatology. In regression analyses, however, MAC-Q scores were not predictive of cognitive performance in the studied tests.

With regards to sex, the related literature has documented that there is a predominance of women with memory complaints. Almeida²⁹ demonstrated that among patients with memory complaints, 71.5% were women. Guerreiro *et al.*³¹ found that 90.2% of complaining elderly individuals were women, yet pointing out the higher presence of women within the surveyed population. In the present research study, women reported higher perception of memory decline

than did men. This finding, however, could be associated with the lower level of schooling among women in the sample.

Age has been considered a predictive variable regarding memory complaints^{32,33}. Earlier studies did not, however, use the MAC-Q to assess memory complaints. The present paper did not observe higher MAC-Q scores among older subjects, congruently with Lima-Silva and Yassuda¹⁴.

In the present analysis, memory complaints were associated with participants' level of schooling. Less educated individuals had a heightened perception of decline in memory-related tasks. Minett *et al.*³⁴ found the same correlation, in disagreement with Vianna-Paulo and Yassuda³⁵. It is noteworthy that the above-mentioned correlation tends to be detected in studies with larger sample, with longitudinal design or in population-based studies.

In an epidemiological study of cognitive complaints conducted in Madrid with 1,637 individuals aged over 64 years, 524 respondents (32.4%) reported complaints. A stronger correlation was found between complaints and age, quality of life, depression and anxiety than with objective cognitive decline³². These data are in line with the findings of the present study, which also suggest that there is an increased presence of complaints among elderly individuals with a greater number of depressive symptoms and no association with performance in cognitive tests.

Ávila and Bottino³⁶ documented that patients diagnosed with major depression may have impairment in several cognitive abilities, including psychomotor skills, memory, reading comprehension, verbal fluency and executive functions. It is possible that depressive symptoms are associated with poorer cognitive performance and that poorer performance is accompanied by cognitive complaints. It is also plausible that depressive symptoms are associated with a heightened perception of cognitive impairment. Results from the present research study are consistent with these hypotheses, as GDS scores were correlated to poorer cognition and to increased perceptions of memory decline.

Limitations related to the present paper include the use of a memory complaint screening questionnaire focusing on the perception of decline in memory tasks, and the lack of investigation regarding the perceived consequences of this decline in everyday life. Another important limitation is the fact that the sample comprises only elderly subjects with preserved cognition, according to the MMSE. The reduction in sample size slightly raised the sampling error and restricted the variability of cognitive scores. Among the merits of this study, the fact that it is population-based stands out, making it less liable to biases typical of clinical samples and of outpatient samples.

For future studies, we suggest the investigation of memory complaints among young and older adults, relating them to other variables, such as morbidities or active lifestyle. These studies may contribute to a better understanding of the associations between complaints and cognitive performance among the elderly and in the general adult population.

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