Relationship between subjective memory complaints, objective memory performance, and depression among older adults

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Abstract

A growing number of studies have investigated the relationship between the elderly subjective memory complaint and their actual memory performance. If memory complaints can be used as indicators of actual memory deficits, these complaints could be an invaluable test for early detection and management of dementia disorders. This study examined the relationships between the elderly subjective memory complaint and their objective memory performance while taking into account several factors such as health and depression. The individuals with subjective memory deficits scored higher on the depression scale in comparison to the individuals without subjective memory problems. However, the alert elderly subjective complaints should be taken seriously while evaluating for dementia.

Key words: elderly, subjective memory, objective memory, depression

Introduction

There appears to be a great deal of publicity in the popular and scientific media concerning loss of memory in old age.[1] Among the elderly, the fear of dementia has raised sensitivity to symptoms that range from forgetting where they left their keys, to not being able to remember familiar names. Consequently, subjective memory complaints are frequent.

Several investigators[2-5] demonstrated that, in a community survey, as many as 23 percent of the elderly reported subjective memory complaints. These complaints may appear in the form of specific memory deficit and sometimes, within broader contexts, include affective aspects.

If memory complaints can be used as indicators of actual memory deficits, these complaints could be an invaluable test for early detection and management of dementia disorders. If subjective complaints are valid indicators of memory dysfunction, this could reduce the cost of detection, and subjective memory complaints could be taken very seriously. Early detection of memory dysfunction may lead to implementation of new management strategies that include pharmacological as well as nonpharmacological interventions.

Several investigators have studied the relationships between subjective memory complaints and the objective memory impairment. For example, Cushman[6] addressed the influence of depression, physical health, and education of the participants among 130 community-dwelling elderly. The research participants were recruited through an advertisement that was placed in the local paper. The individuals were encouraged to participate in this study if they had felt that their mood was down and that they had some degree of memory problems. Additionally, the participants were offered seven session workshops that were designed to teach relaxation and cognitive strategies for relief of their depression and potential memory problems. The mean education of the participants was 14.8 years. Participants' subjective memory complaints were established based on the Memory Assessment Clinic self-rating scale.[6] Additionally, the participants' objective memory deficits were established by using an uncommonly used American Version of Nelson Adult Reading test that is more of a vocabulary measure than an actual memory test. However, the result of their study suggested that depression, as measured by the Beck

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Depression Inventory and Geriatric Depression Scale, relates significantly to participants' memory complaints.

Collins and Abeles[1] studied the relationship between subjective memory complaints and the affective state. Participants in this study were 90 community-dwelling individuals with ages ranging from 51 to 91 years. Their findings indicated that patients' self-rated memory scores were related to affective state rather than objective memory deficit. Individuals who also had greater somatic complaints such as insomnia and pain demonstrated a greater degree of memory complaints.

Several studies[7] considered the role of personality traits in occurrence of memory complaints in late life. There were a total of 403 individuals who participated in this study ranging in age from 67 to 78 years. The personality traits were determined using two subscales of hypochondriasis and psychasthenia of the Minnesota Multiphasic Personality Index. The findings suggested that even though complaints of memory loss did not correlate with the actual memory performance by those who most emphatically complained of memory loss, they have greater tendencies towards somatic complaining, higher feelings of anxiety about their physical health, and more negative feelings of their own competence and capabilities than those who did not have memory complaints.

Others examined subjective memory evaluations and their correlation in patients with focal frontal, diencephalic, or temporal lobe lesions.[8] Participants in this study were 14 patients with a diagnosis of temporal lobe lesions and 15 individuals with frontal lobe lesions. Twenty health control subjects also participated in this study. The patients' severity of damage was significantly varied. In addition, there were subjects who participated in this study two weeks after frontal tractotomy. The overall results of this study indicated that, for the patients with frontal lesion, there is less likelihood of recognizing their memory deficits. Therefore, in these patients, absence of memory complaints is primarily a symptom of their frontal lobe lesion.

Memory complaints of poststroke patients were investigated using a brief questionnaire that examined the most common complaints.[9] In validating their brief questionnaire, they used the Rivermead Behavioral Memory Test as the objective memory assessment. In this study, there were a total of 50 stroke patients (31 men, 19 women). The average age of the patients was 62.7 years (range 50 to 83 years). Patients' median length of time since their stroke was four months (range one to 132 days). There were also 50 normal elderly people (30 men, 20 women) with an average age of 64.2 (range 60 to 78 years). The results of this study showed that there was a significant correlation between subjective and objective memory scores for the elderly after a stroke. Findings demonstrated that, unlike the previous studies using poststroke patients, these patients have an accurate view of their memory status. The majority of other investigations of the relationship between the subjective memory complaints and objective memory deficits are in longitudinal studies. For example, a three-year follow-up study of a group of subjects that were referred for memory evaluation demonstrated that only 8.8 percent of those who had subjective memory complaints developed actual memory deficits within three years.[10] However, the rate of objective memory complaints in a control group without subjective memory complaints was similar. The most significant finding of this study was that age appeared to be the best predictor of memory decline among those who had shown memory complaints.[11]

While investigating the relationship between subjective memory complaints and objective memory deficits of 190 poststroke patients admitted to a local hospital in Nottingham, England, researchers[12] found that there was a significant relationship between the subjective complaints and objective memory deficits. However, in this study, several issues were overlooked. They are as follows:

- a stroke usually causes memory problems, and depending on its origin, may also impair an individual's ability to recognize their deficits;
- strokes often cause depression, which was not measured in this study; and
- nearly 40 percent of stroke patients were excluded because of old age (over age 80).

These studies have six limitations. First, the objective of each of the six studies reviewed above was not to investigate the relationship between subjective and objective memory. Second, these studies were significantly varied in terms of the patient population—some included individuals with clear focal neurological disorders such as stroke, whereas others used community elderly who were either recruited or referred to memory clinics. Third, the sample size was small in many studies. Fourth, the assessment of subjective memory was poor in most studies. Fifth, the measures used in assessing objective memory were significantly different in terms of their specificity and sensitivity. Finally, confounded within the above studies were many factors such as depression and anxiety that brings about life-related complaints in the form of memory complaints.

Thus, this study was designed to address the above limitations and examine the following questions: In the elderly, do subjective memory complaints correspond with objective memory function? What are the characteristics

Table 1. Characteristics of participants in the four designated groups				
Characteristics	**OBJM* = non/mild SUBM** = non**	**OBJM = non/mild SUBM = yes**	**OBJM = mod/sever SUBM = non**	**OBJM = mod/sever SUBM = yes**
Number	197	50	303	53
Age	76.90	75.16	78.41	77.63
Education	9.3	9.5	8.9	8.8
Living with family	68%	70%	71%	69%
Living alone	25%	28%	19%	21%
Assisted living	7%	2%	10%	10%
Income above poverty	32%	33%	31%	31%
Income below poverty	39%	41%	40%	42%
*Objective measure, **Subjective measure				

of the elderly with or without subjective memory complaints who do or do not have objective memory deficit?

The secondary objectives of this study were to identify the role that depression, as well as other emotional factors, may play in the creation of subjective memory complaints regardless of any objective memory deficits.

Method

Subjects

Data for this study was collected from 603 individuals ranging in age from 47 to 93, who were referred by family members and professionals in the field of geriatrics and psychology to a memory clinic in northeastern New York between 1990 and 1996. The initial database was composed of 890 patients, but only the 603 individuals assessed using the Cambridge Examination of Mental Disorders of Elderly[13] were included in this study. Sixty-three percent of the individuals where females and 37 percent were males. The participants' living arrangements varied in that the majority of them (60 percent) lived with their respective family members, and 30 percent lived alone and received visits from relatives. The remaining lived in assisted living facilities. The average number of years of education for the participants was nine years, ranging from no education, to some college degrees (Table 1).

Design

In this cross-sectional study, participants were categorized in four groups: those with or without subjective memory complaints and those with or without objective memory deficits (see the measurement section below). In exploring the characteristics of the individuals in each group, the participant's age and mood were used as independent variables, while their subjective memory complaints and their score on the objective measures of memory were used as dependent variables.

Measurements

The main tool of measurement used in this study was the Cambridge Mental Disorders in the Elderly Examination (CAMDEX) that was developed by a British group in 1986 and published subsequently for use by neuropsychologists and other professionals in the field of geriatrics.[13] The instrument involves 304 questions and is divided into six parts:

1. a structured psychiatric interview that incorporates questions regarding the present mental state, previous personal and medical history, and family history;

2. a scale for an objective evaluation of a broad

range of cognitive functions (Cambridge Assessment of Mental Disorders in the Elderly [CAMCOG]);

3. a standardized schedule for recording observations of the present mental state;

4. a structured interview with a relative or other informant to provide independent information regarding the subject's general mental functioning, previous history, everyday competence and adaptation, current symptoms, and previous medical conditions;

5. a brief physical examination, including neurological examination; and

6. a record of laboratory findings and present medications.

Objective memory assessment

The CAMDEX is a broad psychiatry-related scale whose reliability and validity have been studied by many investigators.[14-16]

Agreement on subscales of the CAMDEX was also calculated. It was determined that the subscales were correlated with the overall scale. Similar data were obtained regarding the cognitive performance portion of the CAMDEX. The independent judgment of two psychiatrists was plotted against the CAMCOG data and resulted in at least 88 percent agreement rates.

The CAMCOG includes a total of 11 subscales that measure orientation, language comprehension, language expression, remote memory, recent memory, learning memory, attention, praxis, calculation, abstract thinking, and perception. The total score obtained from these subscales is 107. The three targeted memory subscales being used in this study were remote memory (REM), recent memory (RCM), and learning memory (LRM). The REM subscale is composed of six questions with a maximum score of 6. The RCM subscale is made up of four questions with a maximum score of 4, and the LRM subscale comprises three questions with a maximum score of 17. To assess the objective memory functioning of the participants, ordinarily, the total CAMCOG score is used. However, for differential diagnosis testing, one may rely on each and every subscale mentioned above. A score of 85 and lower is suggested to be associated with clinical signs of impairment pointing to probable dementia.

CAMDEX also includes scales for assessing activities of daily living (ADLs) and depression, with the depression scale based on self-report and an informant's response. In the original 1989 CAMDEX, response to a key item in the depression severity scale (e.g., Do you feel sad, depressed, or miserable?) was found not to be correlated with cognitive performance. However, it correlated with the informant's report of depression. Many investigators have replicated these findings[17-20] regarding multi-infarct assessments and the organicity of the measured behaviors.[21]

Memory scale

Several scales have been generated using a number of questions within the body of this instrument. Relevant to this study are subscales of recent and remote memory, as well as learning memory that formulate the objective memory assessment used in this study. The maximum value of the memory subscale is 27. It is indicated, in the revised CAMDEX, that the mean score of a community sample was at 20.7, with 31 percent of the sample obtaining the maximum score. The performance range was 4 to 27. In CAMDEX, the mean performance on subscales of remote memory, recent memory, and learning memory was reported as follows:

- the mean performance for remote memory was reported to range from 4.7 to 2.94 for nondemented to mildly demented patients;
- the mean performance on recent memory is reported to range from 4.7 to 2.94 for nondemented to mildly demented patients; and
- the mean performance on learning memory is reported to range from 4.7 to 2.94 for nondemented to mildly demented patients.

Additionally, a Pearson correlation coefficient was calculated to determine the extent of the relationship between the three memory subscales listed above. The correlation coefficients between the RCM and LRM and REM were 0.92, 0.87, and 0.88, respectively. Given the strong correlation between the subscales of memory, a composite score with a maximum of 27 will be used to demonstrate the objective memory score of the participants.

In addition to the above scales, all nineteen items of the Mini-Mental State Examination (MMSE) are built into the test and allow the investigators to obtain a total MMSE score. The CAMCOG sensitivity and specificity for dementia, using MMSE[22] with a cutoff of 21/22 for those over age 60, obtained values of 96 percent sensitivity and 80 percent specificity for the original population.

The scale of depression and anxiety is composed of direct questions posed to the subject regarding his or her mood and anxiety, as well as confirmations that are obtained from the primary care provider. Demographic data were also collected using the CAMDEX demographic questionnaire, identifying the subject's age, education, residency, marital status, income level, social interaction, and occupational backgrounds.

Subjective memory measurement

For this study, we used a total of four questions posed in the first section of CAMDEX subject's interview. These questions are:

- Do you have any difficulty with your memory?
- Do you forget where you have left things more than you used to?
- Do you forget the names of close friends and relatives?
- Have you been in your town and neighborhood and forgotten your way?

Subjects receive a score of 1 for every positive answer they give to each question. Thus, the subject with a score of 4 is indicative of subjective memory complaints, and a score of 0 is indicative of no subjective complaints. In this study, a score of 0 to 2 is considered a low subjective complaint, and a score of 3 to 4 is considered a high subjective complaint. The validity of the subjective measure used in this study was determined in that the subjects' low and/or high scores were correlated with their overall CAMCOG score. Objective memory was correlated with subjective memory ($r = .134$ with $p < .01$).

Procedures

A subject's referral was placed in a folder, along with the interview and CAMDEX questionnaire. Each clinician reviewed this information prior to a patient's evaluation. A family member or a close friend familiar with the patient's condition typically accompanied each patient.

The clinicians that evaluated patients over the five-year period were from various disciplines such as nursing, social work, and psychology. CAMDEX was the memory clinic's primary assessment tool, and all of the clinicians received extensive training using videotape, direct observation, and several practice trials. Each clinician and the principle neuropsychologist at the center would see the patient together. The clinician would complete the evaluation and score the CAMDEX separately. Next, the agreement rates were calculated. The goal was for the agreement eventually to be 95 percent. To assess the data agreement between the clinicians and the neuropathologists, clinicians' CAMDEX scoring was tested at random. All scoring obtained through this method indicated an increase in the agreement. The clinicians were allowed to collect their own separate data when their inter-rates reliability was at least 80 percent.

The data were collected, scored, and placed in the patient's file. Data were then entered into a personal computer via Microsoft Access Program for reporting and follow-up case management. Two research assistants at the center entered the data into the computer. The procedure required one person reading the data and the other watching its entry into the data bank. For the purpose of this study, a separate complete check of the entire data set was completed against the actual CAMDEX information in each patient's file.

Results

The main objective of this study was to obtain a clearer demonstration of the relationship between subjective memory complaints and objective memory function. Furthermore, it intended to describe the characteristics of the elderly with or without subjective memory complaints who did or did not have objective memory deficit.

The primary analysis carried out in this study aimed to identify the characteristics of the patients that fall within the four designated groups. Table 2 demonstrates the mean and the confidence interval for each group.

As demonstrated in Table 1, four groups of patients emerged. They were classified as follows:

- Group 1 (G1), which included individuals with no objective memory and no subjective memory problems;
- Group 2 (G2), which included the individuals with no objective memory deficit and with subjective memory problem;
- Group 3 (G3), which included individuals who demonstrated objective memory problems but no subjective memory problems; and
- Group 4 (G4), which included individuals who showed objective memory deficit as well as subjective memory problems.

Table 2. Mean and confidence interval of designated four groups				
Continuous variables	**Non/mild objective memory No subjective memory n = 197**	**Non/mild objective memory Yes subjective memory n = 50**	**Moderate/severe objective memory No subjective memory n = 303**	**Moderate/severe objective memory Yes subjective memory n = 53**
Age	76.90 (74.79 – 78.01)	75.16 (72.65 – 97.65)	78.41 (77.55 – 79.26)	77.63 (77.55 – 79.26)
Recent memory	1.97 (1.77 – 2.16)	2.06 (1.71 – 2.40)	0.19 (0.13 – 0.25)	0.32 (0.15 – 0.48)
Remote memory	3.64 (3.40 – 3.80)	3.66 (3.22 – 4.09)	1.21 (1.06 – 1.35)	
Learning memory	8.61 (8.16 – 9.03)	9.10 (8.22 – 9.97)	2.23 (2.01 – 2.45)	1.30 (0.95 – 1.65)
Total objective memory	14.22 (13.61 – 14.81)	14.82 (13.65 – 15.98)	3.63 (3.33 – 3.91)	2.51 (1.96 – 3.05)
MMSE	21.45 (20.85 – 22.04)	21.76 (20.65 – 22.86)	12.51 (11.81 – 13.20)	3.23 (2.34 – 4.11)
Total CAMCOG	66.44 (64.92 – 67.95)	69.78 (66.98 – 72.57)	37.50 (35.45 – 39.53)	42.21 (37.39 – 47.02)
Depression	3.36 (2.80 – 3.91)	4.20 (2.89 – 5.50)	2.44 (2.05 – 2.82)	4.13 (3.45 – 4.80)
Fun-ADL	5.00 (3.68 – 6.31)	6.44 (3.75 – 9.12)	4.64 (3.84 – 5.44)	5.83 (1.16 – 6.94)
ADL	5.30 (4.47 – 6.12)	6.20 (4.58 – 7.81)	5.80 (5.08 – 6.51)	6.17 (4.27 – 7.57)
Falls	2.45 (1.95 – 2.94)	2.50 (2.05 – 2.82)	2.83 (2.50 – 3.15)	1.72 (1.20 – 2.23)
Frailty	2.58 (1.87 – 3.28)	2.50 (1.87 – 3.28)	3.33 (2.92 – 3.74)	14.53 (12.93 – 16.11)
Subjective memory	0.59 (0.48 – 0.70)	3.20 (3.08 – 3.31)	0.48 (0.38 – 0.56)	3.25 (3.12 – 3.36)

Table 1 depicts the overall demographic characteristics of these groups.

Although the number of subjects in each of the four groups varied significantly, age, education, lifestyle, and income did not appear to be distinguishing factors between them.

Additionally, as demonstrated in Table 2, mean and confidence intervals were calculated for the four groups to determine any existing differences between the four groups' cognitive domain indicators, as well as depression, ADL, frailty, and falls. As expected, the subjects' performance on the measure of total objective memory demonstrated an overall significant mean difference between the subjects with and/or without memory deficits ($f [1,602] = 9.92$; $p < .01$). Similarly, the mean score of the two main groups that demonstrated subjective memory or no subjective memory, disregarding their objective memory performance, appear to be significantly different ($f [1,602] = 4.67$; $p < .05$).

The individuals with subjective memory deficits demonstrated a significantly higher score on the depression scale in comparison to the individuals without subjective memory problem and with or without objective memory deficit ($f [1,602] = 6.80$; $p < .05$). The highest rate of frailty was seen among those with lower objective memory. Particularly, the subjects in G4 that experience both objective and subjective memory deficit appear to have the highest level of frailty ($f [3,602] = 8.76$; $p < .01$).

A Pearson correlation coefficient was calculated. There appears to be a significant correlation between several factors. Objective memory was correlated with

subjective memory ($r = .134$, $p < .01$). Depression and subjective memory was correlated at $r = .53$ with $p < .02$. Furthermore, age appeared to be correlated with objective memory score ($r = .76$, $p < .01$).

Discussion

This study addressed the following two questions:

1. In the elderly, do subjective memory complaints correspond with objective memory function?

2. What are the characteristics of the elderly with or without subjective memory complaints who do or do not have objective memory deficit?

The secondary objectives of this study were to identify the role that depression and other emotional factors may play in the creation of subjective memory complaints, regardless of any objective memory deficits.

The answer to the first question above appears to be positive in that we found significant correlation between the two types of memory. However, in terms of predicting the direction of the objective memory via the subjective memory, it appears that one also has to consider the role of depression.

Our findings agree with those of other colleagues[1] that have demonstrated that depressed elderly show greater signs of somatic complaints and complaints regarding their memory capabilities. Cushman and colleagues[6] asked if there were any relationships between elderly memory complaints and their age. They studied 130 community-dwelling elderly people and found that age was not a significant indicator of memory complaint by itself. Physical health and depression were better predictors of memory complaints.

The second question asked in this study was about the characteristics of people with or without subjective memory problems who may or may not have any objective memory deficits. Our findings indicated that age was not a predictor of subjective memory problems nor was the subject's income, living status, or education. The subjects who had indicated a greater subjective memory problem only showed greater signs of depression. It appears that frailty and depression are also useful indicators of subjective memory problems. Additionally, individuals who resided in long-term care homes (e.g., assisted living) had a higher rate of depression, subjective memory problems, and objective memory deficits, than individuals who resided with their families.

In summary, our findings suggest that elderly subjective memory complaints must be taken into account while reviewing the overall mental health and well-being of the elderly. It appears that in situations where subjective memory complaints did not account for objective memory deficit, it accounted for another important variable, namely depression.

This study has several strengths worthy of review. First, the number of patients that participated and the type of instruments used in this study will allow a great deal of confidence in generalizability of our findings. On the other hand, we still believe that the most useful data in terms of the role of subjective memory complaint as predictor of objective memory performance will be obtained in longitudinal studies.

The future research in this area must take into consideration the fact that relationships between subjective memory complaints and objective memory performance go through the modality of depression. Therefore, including a control group without depression may shed light on understanding the memory modality without being influenced by depression.

Conclusion

In conclusion, given the scope of the relationships between the subjective memory complaints, objective memory performance, and depression it is reasonable to make subjective memory questions a part of any cognitive and/or mental health assessment procedure used for the elderly. Additionally, other factors such as the patients' frailty level, need for assistance, and overall well-being are useful information that will better clarify the origin of their subjective complaints.

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