

# Depressive symptoms and cognitive performance of the elderly: relationship between institutionalization and activity programs

## Sintomas depressivos e desempenho cognitivo nos idosos: relações entre institucionalização e realização de atividades

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### Abstract

**Objective:** The aim of this study was to assess the frequency of depressive symptoms and to evaluate cognitive performance of institutionalized versus non-institutionalized elderly subjects and to compare the effect of institutionalization and participation in the institution's activity programs on their cognitive performance. **Method:** A group of 120 elderly subjects with a mean age of 71 years and average schooling of 4.2 years was evaluated. The participants were divided into 3 groups: non-institutionalized ( $n = 37$ ); institutionalized with activities ( $n = 37$ ); institutionalized without activities ( $n = 46$ ). The groups were matched for age, gender and educational level. The following assessment instruments were used: the Geriatric Depression Scale, the Mini-Mental State Examination, the Verbal Fluency Test and the computerized versions of the Hooper Visual Organization Test and the Boston Naming Test. The data were analyzed using one-way ANOVA and the Pearson's correlation test. **Results:** The two groups of institutionalized elderly showed higher frequency of depressive symptoms when compared to non-institutionalized subjects and worse performance on the Verbal Fluency Test. The institutionalized group without activities had lower scores on Mental State Examination, Boston Naming Test and Hooper Visual Organization Test when compared to the other two groups ( $p < 0.05$ ). **Conclusions:** Institutionalization of the elderly seems to be related to worse cognitive performance. Activity programs during institutionalization may be effective in minimizing cognitive functional loss.

**Keywords:** Old age assistance; Adjustment disorders; Homes for the aged; Cognition; Depression

### Resumo

**Objetivo:** Avaliar a frequência de sintomas depressivos e o desempenho cognitivo de idosos institucionalizados e não institucionalizados. Comparar os escores nos testes em função da institucionalização e da realização de atividades oferecidas pela instituição. **Método:** Foram avaliados 120 idosos com idade média de 71 anos e escolaridade média de 4,2 anos, divididos em três grupos: Não institucionalizados ( $n = 37$ ); Institucionalizados com atividade ( $n = 37$ ); Institucionalizados sem atividade ( $n = 46$ ). Os grupos foram pareados em função da idade, sexo e escolaridade. Foram aplicados os instrumentos: Escala de Depressão Geriátrica, Mini-Exame do Estado Mental, Teste de Fluência Verbal e as versões computadorizadas do Teste Hooper de Organização Visual e do teste de Nomeação de Boston. Foram conduzidas ANOVAs unifatoriais e o teste de correlação de Pearson. **Resultados:** Os dois grupos de idosos institucionalizados apresentaram maior frequência de depressão e pior desempenho na prova de fluência verbal. Idosos de instituição sem atividade tiveram desempenho inferior aos outros dois grupos nos testes Mini-Exame do Estado Menatal, Teste de Nomeação de Boston e Hooper ( $p < 0,05$ ). **Conclusão:** Pior desempenho cognitivo dos idosos parece estar relacionado com a institucionalização. As atividades diárias de estimulação podem ser eficientes em minimizar as perdas cognitivas dos idosos institucionalizados.

**Descritores:** Assistência aos idosos; Transtornos de adaptação; Asilos para idosos; Cognição; Depressão.

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## Introduction

Among the different disorders that may affect the elderly, special attention should be paid to depression due to its high incidence and negative impact on the quality of life<sup>1-2</sup> and cognitive performance.<sup>2</sup>

Studies have shown higher rates of depression among subjects aged 55 to 64 years than in other age frames<sup>3</sup> being the peak curve between 60 and 69 years.<sup>4</sup> However, other studies indicated lower prevalence of depression among the elderly.<sup>5-6</sup> Such inconsistency in the literature can be attributed to differences in the methodology and diagnostic criteria used.<sup>7</sup> The diagnostic criteria for depressive mood disorder in elderly subjects are questionable, as the depressive symptoms in this population may differ from those found in younger people.<sup>1</sup> This may stem either from the fact that elderly people are more likely to experience depressive-triggering events, such as bereavement and painful illnesses,<sup>8</sup> or as a result of cognitive deficits such as memory impairment.<sup>9</sup>

According to Kral<sup>10</sup> and Emery,<sup>11</sup> depression precedes cognitive decline, and, as a consequence, disorientation or memory impairments can be experienced by depressed elderly people. According to Murphy et al., studies have shown that mild and severe forms of depression are associated with deficits in cognition, perceptual-motor ability, and communication, among others.<sup>12</sup> Among the many cognitive functions, memory in the elderly deserves major attention. Previous studies have suggested that its impairment may be related to depression.<sup>8-13</sup>

Parmelle et al. found that depression may be a risk factor for the development of cognitive decline, particularly among institutionalized elderly subjects.<sup>14</sup> Besides, according to Fitcher, institutionalized elderly subjects who remain mentally inactive have their intellectual potential reduced, their creativity affected and tend to show signs of mental impairment.<sup>15</sup> Therefore, institutionalization and lack of activities seem to affect both depression and cognitive performance.

Based on these data, the aim of this work was to compare the frequency and severity of depressive symptoms and cognitive impairment among institutionalized and non-institutionalized elderly. In addition, the effect of activity programs on cognitive performance and depressive symptomatology of elderly subjects was studied.

## Method

### 1. Subjects

One hundred and twenty elders, men and women, with mean age of 71 years and average schooling of 4.2 years, were assessed. The study sample included non-institutionalized (Group 1) and institutionalized (Group 2) subjects. The institutionalized subjects were distributed into two sub-groups: Group 2A, formed by subjects from institutions providing free time and occupational activities; and Group 2B, formed by subjects with no activity program. There was inter-group balance regarding age, gender and educational level. The exclusion criteria were diagnosis of dementia and the Mini-Mental State Examination score below ten, as this score suggests a severe cognitive impairment.<sup>16</sup>

### 2. Instruments

The 15-question reduced version of the Geriatric Depression Scale (GDS) was applied.<sup>17</sup> Severity of depressive symptoms was defined according to the following criteria: 0-4, no depressive symptoms; 5-8, mild depression; 9-11, moderate depression; and 12-15, severe depression.

The Mini-Mental State Examination (MMSE)<sup>18</sup> was used for the cognitive screening. Fluency and naming ability were evaluated by the Semantic Verbal Fluency Test (animal category),<sup>19</sup> and the Boston Naming Test,<sup>20</sup> respectively. Perceptual capacity was assessed by the Hooper Visual Organization Test.<sup>21</sup> The last two tests were applied using the computer version in order to record the answers given by the elders to each item of the tests.<sup>22</sup>

### 3. Procedure

This study was approved by the Ethics Committee of the Universidade Presbiteriana Mackenzie (CEP/UPM no. 622/06/04) and the subjects gave their informed consent.

The institutionalized elders were pre-selected by the institution's technicians according to the exclusion criteria and should have a good general health state. Evaluations were accomplished individually at the sheltering institutions and have lasted for one hour in average.

The non-institutionalized elders (Group 1) were selected according to the same exclusion criteria and matched for gender, age and years of education. They were recruited and evaluated in settings with social programs, e.g., community centers, church groups and elderly associations. The selection criteria were the participation of the elderly in activities accomplished by these centers, such as trips, theater, regular meetings, sports and other group activities.

The institutionalized subjects were chosen from 10 institutions that nurse elderly of different social and educational levels in the State of São Paulo. In four of these institutions, patients (group 2A) used to participate in activities such as occupational therapy, games, arts and crafts, painting lessons, parties, outside strolling, gymnastics, literacy classes and regular visits of relatives. While in the other institutions (group 2B) no scheduled activities were offered at all, only the basic food, hygiene and health care. In these places, the elders used to spend most of their time watching television or resting.

Statistical Package for Social Sciences 11.5 software was used to analyze the results, and the significance level adopted was 5%. One-way analysis of variance (ANOVA) was performed, and the independent variables were groups (1, 2A or 2B). The dependent variables were the scores obtained in the GDS and in the neuropsychological tests. The correlation between the test measurements was accomplished using Pearson's correlation test. Bonferroni test was used for *post hoc* analyses.

### Results

In order to verify the inter-group variability, ANOVA was performed for age, gender and educational level. Results indicated that the groups were matched, since there were no significant differences between them. The groups' characterization results are summarized in Table 1.

The effect of institutionalization on the GDS score and the neuropsychological scores were evaluated by the ANOVA. The inter-group differences were significant for the scores of GDS ( $F = 8.59$ ;  $p < 0.001$ ), Semantic Verbal Fluency ( $F = 10.11$ ;  $p < 0.001$ ), MMSE ( $F = 6.05$ ;  $p = 0.003$ ), Boston Naming Test ( $F = 11.99$ ;  $p < 0.001$ ), and Hooper ( $F = 7.81$ ;  $p < 0.001$ ). The results of each test are described in Table 2.

*Post hoc* analyses were performed for pair-wise comparison. In the GDS and Verbal Fluency tests, the performance of the non-institutionalized elders was significantly better than that of institutionalized ones. In the MMSE, Boston Naming

**Table 1 - Characterization of participants: age, educational level of not-institutionalized participants (Group 1) and institutionalized ones with activities (Group 2 A) and without activities (Group 2 B)**

Group	Participants			Age		Educational level		
	Men	Women	Total	Mean	SD	0-4 yr	5-8 yr	Above 9 yr
Group 1	12	25	37	71	8.80	28	6	3
Group 2A	20	17	37	72	9.56	24	8	5
Group 2B	20	26	46	72	10.56	36	4	6
Total	52	68	120	71	9.68	88	16	14

and Hooper tests, the scores of the elders in non-activity-based institutions were significantly lower than those of the other groups.

The analysis of the severity of depressive symptoms for the three groups indicates mild and moderate depression in the non-institutionalized group, and mild, moderate and severe depression in the institutionalized one. Within group 1, five subjects showed mild depression, and 2 showed moderate depression. Within group 2A, 12 patients had mild, 4, moderate and 1, severe depression. Within group 2B, 19 patients were classified with mild, 5 with moderate and 4 with severe depression. Thus, the prevalence of depressive symptoms among the institutionalized individuals was 54.22%, while among the non-institutionalized the prevalence was 18.92%.

*Post hoc* pair wise comparison analysis for each of the items in the GDS showed inter-group variation of answers. The institutionalized elders without activities presented higher statistical tendency to depressive answers for the item number 2 ('Have you dropped many of your activities and interests?') and differed only from the non-institutionalized in the items 3, 4, 7 and 13 ('Do you feel that your life is empty?', 'Do you often get bored?', 'Do you feel happy most of the time?', 'Do you feel full of energy?').

Regarding institutionalization, of note, the institutionalized elders (group 2) showed more depressive answers than the non-institutionalized group in items 1, 8, 9 and 14 ('Are you basically satisfied with your life?' 'Do you often feel helpless?' 'Do you prefer to stay at home, rather than going out and doing new things?' 'Do you feel that your situation is hopeless?') There was also an inter-group difference observed in item 15 ('Do you think that most people are better off than you are?'). The patients in the group without activities performed worse than those with activities, who in turn performed worse than the non-institutionalized ones. There were no significant differences between the groups for the average score in the items 5, 6, 10, 11 and 12.

**Table 2 - Mean score and Standard Deviation of The Geriatric Depression Scale and the neuropsychological tests of non-institutionalized elderly (Group 1), institutionalized ones with activities (Group 2A) and without activities (Group 2B)**

	Group 1 (n = 37)	Group 2A (n = 37)	Group 2B (n = 46)	
GDS	2.43 (± 2.67)*	4.16 (± 3.44)	5.46 (± 3.63)	a, b
Verbal fluency	15.38 (± 6.60)**	12.03 (± 5.14)	10.30 (± 3.58)	a, b
MMSE	24.24 (± 3.20)	24.18 (± 4.14)	21.69 (± 4.09)**	b, c
Boston	12.30 (± 2.25)	11.40 (± 3.00)	9.30 (± 3.00)**	b, c
Hooper	8.72 (± 5.84)	8.61 (± 5.75)	4.63 (± 4.80)**	b, c

Significance differences between the pairs: a) non-institutionalized elderly X institutionalized elderly with activities; b) non-institutionalized elderly X institutionalized elderly without activities; c) institutionalized elderly with activities X institutionalized elderly without activities (\* $p < 0.05$  \*\* $p < 0.01$ )

Pearson's correlation was used to determine the relationship between depressive symptoms and performance on cognitive tests. Results revealed that the GDS scoring was inversely correlated with the Verbal Fluency Test score, and did not present any significant inverse correlation with the MMSE, Boston or Hooper scores. However, the neuropsychological tests positively correlated with each other. The highest correlations found were those between the Boston and Hooper tests and both tests were positively correlated with the MMSE. Table 3 summarizes the correlations between the tests and the depression scale.

**Table 3 - Pearson Correlation between the Geriatric Depression Scale (GDS) and the neuropsychological tests (MMSE, Boston, Verbal Fluency, and Hooper)**

	GDS	MMSE	Boston	Verbal Fluency	Hooper
GDS	-	-0.132	-0.105	-0.193*	-0.064
MMSE	-	-	0.532**	0.371**	0.455**
Boston	-	-	-	0.393**	0.737**
Verbal Fluency	-	-	-	-	0.315**
Hooper	-	-	-	-	-

\* $p < 0.05$

\*\* $p < 0.01$

## Discussion and conclusion

Our results indicated higher rates of depressive symptoms for institutionalized elders. These findings are confirmed by other studies that estimated an incidence of depression four times higher among the institutionalized elderly people.<sup>23</sup> Other studies correlated the depression prevalence among institutionalized elders with factors such as the overall clinical state, institutionalization time and intelligence level.<sup>24</sup>

No significant differences for depressive symptoms were found between the inactive institutionalized elders and those who had activities, indicating that involvement in activities has no effect on the severity of depression.

Activities, however, seem to be correlated to the performance on cognitive functional tests. Thus, the performance on the MMSE, Hooper and Boston Naming tests was significantly worse for inactive institutionalized participants. According to Argimon and Stein,<sup>25</sup> a higher number of activities performed by elderly people seem to be a protective factor to their cognitive conditions. Among such activities may be listed meetings with friends and family members, leisure and cultural and physical activities.

This study found a high correlation between MMSE, Boston and Hooper tests. Although these neuropsychological tests evaluate distinct cognitive functions, such as overall mental functioning, visual-perceptual organization and naming, the

verbal ability impairment might be responsible for such high correlations, since the answers for each item of the tests were given verbally.

As expected, the verbal fluency was inversely correlated with depression. The institutionalized participants presented higher scores in the GDS and, consequently, scored lower on verbal fluency tests. According to Fossati et al., the deficit in verbal fluency reflects the difficulty of depressive patients to make use of effective semantic strategies to retrieve target words, and therefore, is related to a higher deficit in executive functions.<sup>26</sup>

The understanding of the relationships between depressive symptoms and institutionalization should be further investigated, as in our study it was not possible to determine if institutionalization alone unleashes depression, or if there is a higher number of depressed elderly people institutionalized by their families. The same relationship may be considered when thinking about cognitive decline and institutionalization. One possible way to answer these issues would be by the systematization of the cognitive screening tools and the assessment of depressive symptoms and cognitive functions at the time of institutionalization. The use of standardized assessment procedures enables us not only to track current mental states of institutionalized elderly subjects, but also provides periodical reevaluation.

Besides this methodological limitation, the results point out to the need of cognitive stimulation of the institutionalized individuals, since a good cognitive functioning is one of the crucial factors to maintain the mental health and life quality of the elderly. However, such stimulation activities may result in higher institutional cost and, consequently, increased expenses for the families.

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