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DEPRESSION AND MEMORY:
A COMPARATIVE STUDY OF YOUNG AND OLD WOMEN

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The study compared the prevalence of depression, memory dysfunction, and the influence of depression on memory in two contrasting age-groups of women: young – the mean age of ~23 years (35 subjects) and old – the mean age of ~70 years (44 subjects). The study population samples were subdivided into depressive and nondepressive groups, according to the presence and absence of depressive symptoms, respectively, as assessed with the Center for Epidemiologic Studies Depression Scale (CES-D). Memory function was assessed with a modified Visual Letter Recall Test, University of Washington, Seattle, USA. The results show that the prevalence of depression was greater in the group of young compared with the old women; 63% vs. 41% of subjects, respectively. The intensity of depression was moderate in both age-groups. The accompanying memory dysfunction was significantly greater in the group of old than young women; 43% vs. 18% of missed letters on recall, respectively (P<0.05). The results failed to lend support for a causative link between depression and memory dysfunction. Memory deficit did not intensify with increasing depression score and also was present in the women without depression in both age-groups. In conclusion, older age in women not necessarily leads to more frequent appearance of depression, and a decline in memory function with advancing age also has to do with factors other than depression.

Key words: age, depression, memory function

INTRODUCTION

Human memory deteriorates with age and this deterioration intensifies at older age. Memory dysfunction at older age is usually thought to be one of the symptoms
of the normal aging process. Research also shows that memory dysfunction is a symptom of depression independent of age. Older age, according to some sources, predisposes to depression, which occurs more often among women. It can be expected that older women may reveal intensified memory dysfunction due to mutual interaction between these disadvantageous factors. In previous research (1), we did indeed find a large percentage of women with depression and memory dysfunction among a group of older women – both ca 40%. We did not, however, confirm a causative connection between depression and memory dysfunction, because these dysfunctions were also similar among older women without depression. Nor did we find intensification of memory dysfunction correlated with intensification of depression symptoms, measured with a psychometric scale.

Data received from a population of older women cannot fully explain the influence of age on the correlation between depression and memory dysfunction. Therefore, research was extended onto a group of younger women. In this paper we present results concerning depression and memory dysfunction among young women and compare them with the results obtained previously among older women.

MATERIAL AND METHODS

The study was approved by the Review Board of the Institute of Psychology of Opole University in Poland. Informed consent was obtained from all subjects, who also were ascertained about the anonymity of the psychometric tools used.

Subjects

In the extended research, a group of 35 women were tested, all of which were students of Opole University in Opole, Poland. The mean age of these women was 22.8 ±0.6(SE) years. All of the women were healthy, without apparent psychological or somatic symptoms or ailments. They were not receiving any medication, which could affect cognitive processes.

Results were compared with the data obtained previously from research on a population of older women, 44 women with a mean age of 67.8 ±1.1 years, all of which were students of the Mokotów University of the Third Age in Warsaw, Poland (1).

Psychometric tools

In both test series, carried out in a monthly interval, the same psychometric tools were used. For measuring the intensity of depression symptoms The Center for Epidemiologic Studies Depression Scale (CES-D), developed by the University of Washington, Seattle, USA was used, with some modifications. The task of the examined women was to mark how often during the last week they observed symptoms mentioned on the scale. Selecting less than 1 day meant rarely/never, 1-2 days: sometimes/for a short time, 3-4 days: moderately often/occasionally, 5-7 days: very often/constantly. Occurrence of symptoms was appropriately marked and an aggregate result of sixteen or more pointed to depression in the tested person.

The assessment of functioning of working memory was done using a Visual Letter Memory Test, which is our modification of the Working Memory Recall Test developed by the University of Washington, Seattle, USA. The test consisted of showing six letter chains (2, 4, 6, 8, 10, and 12
letters), each of which lasted for five seconds. After seeing each chain, persons were asked to write down as many letters as they have managed to remember, in any order, in ten seconds. Writing down letters in any order allowed avoiding the primacy and recency effects, which has been confirmed when analyzing result sheets.

**Data evaluation**

Results were expressed as means ± standard error (SE) of mean. Memory deficiency was calculated based on the percentage of forgotten letters out of all of the letter chains shown. Differences between the mean result for the depressive and non-depressive groups in both age categories and between these categories were estimated using a t-test method for independent samples. Correlation between intensified depression symptoms, estimated from the CES-D scale and memory deficiency was analyzed using linear regression according to the equation: $y=ax+b$, where $a$ describes memory deficiency change per depression scale unit. A value of $P<0.05$ was taken into account to point to a statistical relevance in the whole survey.

**RESULTS**

Age and memory deficit divided into subgroups of depressive and non-depressive women in both populations are shown in Table 1. Within both age-groups no major differences were found, apart from the obvious – intensity of depression symptoms differentiating depressive and non-depressive women. A comparison of depressive subgroups of women in both age-groups shows a substantially higher level of memory deficiency among older women, despite the lack of a difference in depression intensity between both groups. It is worth noting that a similar difference, i.e., much higher memory deficiency (ca 2.5 times) was also observed among the older population without depression in comparison with

<table>
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<tr>
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<th>Young</th>
<th>Old</th>
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<tbody>
<tr>
<td></td>
<td>Depressive</td>
<td>Nondepressive</td>
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<tr>
<td>Age (yr) (Range)</td>
<td>22 ±0.6 (21-30)</td>
<td>22 ±0.7 (21-30)</td>
</tr>
<tr>
<td>Depression (score) (Range)</td>
<td>26.0 ±2.1 (16-46)</td>
<td>9.8 ±1.0** (4-15)</td>
</tr>
<tr>
<td>Memory deficit (% of missed letters) (Range)</td>
<td>18.1 ±1.5 (7-33)</td>
<td>16.9 ±1.4 (10-25)</td>
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<tr>
<td>Prevalence of depression (%)</td>
<td>63</td>
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Values are means ± SE and range in brackets. Memory deficit was assessed from the percentage of missed letters using a Visual Letter Recall Test and depressive symptoms were scored using The Center for Epidemiologic Studies Depression Scale. *$P<10^{-9}$ between the corresponding subgroups of old and young women. **$P<10^{-4}$ between the depressive and nondepressive subgroups within either population.
non-depressive young women. Table 1 also presents the prevalence of depression in both age groups. The results show that the prevalence was substantially higher in the young than in the old women, 63% vs. 41%, respectively. The intensity of depressive symptoms, assessed with the CES-D scale was weak to moderate in both age groups, not exceeding 46 on a 60 point scale.

The influence of depression on memory deficiency in both age-groups is illustrated in Fig. 1. Regression analysis did not show any meaningful correlation between the depression level, as assessed with the CES-D scale, and memory deficiency in either the young or old woman groups. Interestingly, however, there were opposite, although statistically insignificant, trends concerning the two groups. Among older women, an increase in the depression level was associated with a tendency to lower memory deficiency and among younger women to a higher memory deficiency (Fig. 1).

DISCUSSION

In this paper we compared the level of depression and memory deficiency and the influence of depression on the functioning of memory in two extreme age groups of women: younger - average age around 23 years and older – average age of about 70 years. The result of these comparisons is quite unexpected. First of all, the prevalence of depression proved to be about 1.5 times higher among younger women. This result is consistent with recent research that shows that the
occurrence of depression is in fact higher among people aged 18-29 years than people over 65 years of age (2). Our research did not confirm other works indicating progress in depression in the elderly, especially among women. Some of those papers pointed to a twice more frequent occurrence of depression among older people (3, 4) and even that depression can reach 70% of an adult population, which is dominated by people over 65 years of age (5).

Depression in both age groups, although more frequent among young women, was of a similar, moderate intensity of symptoms. Depression was accompanied by memory deficiency in both age groups. This deficit was more than twice as high in the group of older women, despite similar levels of depression in both groups. So, we have a situation of less frequent occurrences of depression among older women, with a similar level to that observed in young women, which is accompanied by larger memory disorders. The discordance in the association between depression and memory deficits indicates either the lack of an impact of depression on memory disorders or that depression affects memory more in older than in younger age. The latter possibility is rather dubious, since memory deficiency, similar to that in depression, also was observed without depression among both younger and older women (Table 1).

We did not find a significant deterioration of memory with the rise in the depression scale either (Fig. 1). It is interesting that among older women we even noted a reverse trend - reduction of memory deficit with the rise in depression. Based on the analysis we come to the conclusion that in the studied populations of young and older women depression does not have a major effect on the occurrence and escalation of memory disturbances. Greater levels of memory disorders in elderly women may depend on factors unrelated to depression, such as changes in the brain caused by atherosclerosis or other metabolic changes, which do not appear as obvious syndromes of illness. They may be accompanied by changes in the brain’s executive or cognitive systems, such as disturbances in concentration, which develop in older people and are absent among young people. This would be consistent with considering memory as a comprehensive set of certain separate executive processes dependent on the proper functioning of various systems in the brain. The methodological approach used in the present research could not give insight into the overall functioning of the brain.

Results of tests are usually subject to many factors, e.g., psychometric tools used, treatment of variables, and the selection of the groups surveyed. Targeted subpopulation of older women was specific, because they were members of the University of the Third Age. It is plausible that life style and regular exercise in mental activity had a relatively small impact on the severity of symptoms in women with depression. On the other hand, young university students tend to be under stress, which may trigger and aggravate depression. This could be a reason for the leveling of depression intensity between the age-groups. Hormonal differences should also be stressed, which affects both depression and memory (6). Estrogen can improve the functioning of memory, its low levels in women
after menopause may contribute to memory difficulties. These limitations could influence the results obtained and thus the study outcome may not be applicable to the overall population.

Despite the limitations, we believe that our research has shown that depression occurs more often in young than in older women and its intensity is similar in both age-groups. Coexisting memory disorders are significantly higher among older women. Tests have not confirmed a significant causal link between depression and impaired memory. The latter is also present in the absence of depression in both age groups. In conclusion, older age of women does not necessarily lead to more frequent occurrences of depression, and deterioration of memory function in older age is also dependent on non-depression-linked factors.

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