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The specificity and the affective sign of autobiographical memories in individuals with depressive disorders and alcohol use disorder

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Summary

Aim. Mental disorders may disrupt autobiographical memory (AM). An example is overgeneral memories – without details, generalized or semantic. This paper assesses the functioning of AM in a depressive episode (DEP) and alcohol use disorder (ALC).

Method. The study compared two study groups: hospitalized patients with DEP and ALC, and two control groups: people hospitalized for gastroenterological conditions (CON) and healthy individuals (PAN) ($N = 39$ for each group; mean age: 46.0 ± 13.6 years; no differences). The specificity of AM was examined by the *Autobiographical Memory Test*. Participants rated memories in terms of vividness, affective intensity and sign.

Results. DEP and ALC groups recalled fewer specific memories than the control groups ($p < 0.001$ for: all, positive and negative cue words), with the lowest results in DEP. Clinical groups recalled also more negative and less positive memories ($p < 0.001$) than the control groups, with a deficit of positive ones in DEP and an excess of negative memories in ALC. An analysis of non-specific responses revealed that the ALC group recalled more "extended" memories than the CON group ($p < 0.005$) and more "categorical" ones than control groups ($p < 0.05$). The DEP group remembered more "semantic associations" than the PAN group ($p < 0.001$).

Conclusions. The results confirmed the presence of OGM in both clinical groups. ALC disrupts the mechanism of generating specific memories to a lesser extent than mood disorders. Moreover, subjects from the clinical groups assess their past more pessimistically than the controls, with a reduced number of positive memories in people with a depressive episode, and probably an increased number of negative ones in people with ALC.

Key words: episodic memory, depression, alcoholism

Introduction

Autobiographical memory (AM) is a part of memory that concerns our personal past. It contains memories related to human identity. It is crucial for the functioning of the individual – to achieve current goals it is necessary to recall response to a similar situation in the past [1].

In disorders associated with the occurrence of negative affect (such as depressive disorders), a permanent element appears – overgeneral memories (OGM). This phenomenon was discovered by Williams and Broadbent [2]. They observed that patients after a suicide attempt recalled a greater proportion of excessively general (i.e. lacking in details) memories than controls, in response to both positive and negative cue words.

The most numerous literature describing OGM concerns depressive episodes [3] and they can be a potential tool for assessing its severity [4], a susceptibility factor of its occurrence [5, 6] and persistence [7, 8]. OGM may also appear in related diseases [4, 9]. The close association of OGM with mood disorders, suicide attempts, dysphoria and post-traumatic stress disorder (PTSD) is indicated [3].

The presence of OGM was confirmed in alcohol use disorder (AUD), however, to a lesser extent than in mood disorders [10–14]. However, many uncertainties remain. Is it the result of impaired access to memories in a damaged brain [15]? Or of coexisting depression [11]? It remains unclear which category of memories they relate to.

Affect of memories

Physiologically, there is a tendency to recall the past with a positive inclination. Moreover, emotions associated with unpleasant events fade affectively faster [16, 17]. Cognitive reappraisal (i.e., an attempt to look at the situation from a different, more positive, perspective) is associated with positive memories [18].

Mood disorders change this pattern [19]. In low mood, there is a symmetrical pattern of recalling positive and negative material, in depression, memories are recalled in accordance with the negative mood [20]. The increase in such features of memories as typicality, rumination and personal meaning in the group affected by depressive episode was also confirmed [21]. In addition, a comparison of the characteristics of AM indicated that depressed people did not have more negative memories but rated positive memories as less vivid than the control group. It is indicated that depression may be associated primarily with deficits in the processing of positive memory material [22].

In conclusion, there are reports of easier recalling of memories for cue words with a negative emotional valence in a depressive episode. Despite the inconsistency of the results, one can expect a continuum of a greater and greater recall of negative content – from people without mood disorders, through dysphoric ones, to those suffering from depression [20, 23].

Aim

The main aim of the study was to assess the functioning of AM in physiological and pathological conditions (DEP or AUD, eliminating the comorbidity). We also assumed that the hospitalization factor may play a role in AM disturbances. Therefore, a comparative group of mentally healthy people hospitalized due to the non-life-threatening physical illness was introduced.

Material

Participants

The study was conducted among 156 adults without cognitive impairment, divided into four groups ($N = 39$). Study groups were recruited among patients of the Stanisław Kryzan Psychiatric Hospital in Starogard Gdanski. The first group (DEP) consisted of people with a depressive episode in the course of unipolar and bipolar mood disorders (ICD-10 criteria). The exclusion criterion was the co-occurrence of other mental disorders: psychotic disorders (chronic and acute, which automatically excluded, among others, cases of severe depression with psychotic symptoms and schizoaffective disorder), addictions (the absence of AUD confirmed by the *Brief Michigan Alcohol Screening Test* (bMAST)) and PTSD. Patients with a significant degree of inhibition that disrupted cognitive functions were also excluded.

The second group (ALC) were the people with AUD. The severity of addiction was assessed by the bMAST questionnaire. The exclusion criterion was the co-occurrence of other psychiatric conditions, including an episode of depression (ICD-10 criteria and HDRS score ≥8). The subjects were after alcohol detoxification but did not participate in psychotherapy.

Two comparative groups were used. The control group (CON) consisted of patients with physical ailments admitted to the Clinic of Gastroenterology and Hepatology due to cholelithiasis for non-surgical removal of deposits and with chronic pancreatitis for endoscopic retrograde cholangiopancreatography.

The control group (PAN) consisted of mentally and physically healthy people working in healthcare.

Exclusion criteria in both groups were: the presence of mental illness in anamnesis or currently; diseases potentially affecting the mental state (such as autoimmune systemic diseases); cancer; diseases according to prior knowledge correlated with a high percentage of depression: stroke, unstable coronary disease, diseases of the endocrine system, including thyroid disorders.

The study was approved by the Independent Bioethical Committee for Scientific Research at GUMed (NKBBN/363/2013).

Materials

Demographic data (age, gender and number of years of education) were collected, the respondents assessed the current mood and stress intensity on a 7-point semantic scale. Besides, they completed in random order the *Beck Depression Inventory* (BDI) [24], the *Hamilton Depression Rating Scale* (HDRS, 17-point version) [25] and the following questionnaires.

Autobiographical Memory Test

The Polish version of the questionnaire was based on the *Autobiographical Memory Test* (AMT) [2, 3, 26].

Each response was coded as a specific memory, i.e., for a specific event that lasted less than one day and occurred at a specific place and time or nonspecific. Nonspecific memories were further classified as "extended" (e.g., "two-week holiday with family"), i.e., regarding events lasting longer than one day, "categorical" (e.g., "when I was in high school"), referring to repetitive activities, or "semantic associations" (e.g., "man can be good"). The memory could be also coded as "the same event" if the subject described a previously mentioned event from previous responses and "no response" if the respondent did not recall the memories within the given time frame.

This evaluation procedure is consistent with the classification system used in other studies on memory specificity and evaluated as highly reliable [2, 3]. Since, to our knowledge, the AMT has not been used in Poland so far, apart from our preliminary report limited to people with depression and both control groups [27], we have introduced a reliability assessment for the first 30 measurements. The Cronbach's alpha coefficient was high and consistent (0.896 for all twelve points, at individual points in the range: 0.878– 0.895). After completing the AMT, subjects were asked to assess pleasure and vividness of memories on the semantic differential scale (from 1 – "definitely unpleasant" to 7 – "definitely pleasant").

Brief Michigan Alcohol Screening Test (bMAST)

The bMAST [28] is a tool for assessing the risk and severity of alcohol addiction in terms of two factors – the perception of current drinking and its consequences [29]. Five affirmative answers out of ten may indicate an addiction.

Method

Participants in each group, designated by senior medical personnel as meeting the relevant inclusion criteria, after providing preliminary information about the study and obtaining informed consent, were asked about the presence of exclusion factors

appropriate for the given group. The AMT and HDRS questionnaires were completed with the researcher, while the others – independently, in his presence. Finally, the subjects participated in a debriefing.

Statistics

Unless otherwise indicated, the Kruskal-Wallis test (comparisons) and Spearman's rank coefficient (correlations) were used.

Results

Demographic data of the studied groups

Descriptive statistics of the groups are presented in Table 1. The groups do not differ statistically significantly in their age, years of education and gender distribution.

Table 1. **Demographic data of the studied groups**

	Age*		Nr of women†	Years of education**	
	Mean ± standard deviation	Range		Mean ± standard deviation	Range
Groups					
Control (PAN)	43.5 ± 15.5	21–82	17	12.2 ± 2.9	8–17
Control (CON)	49.4 ± 15.9	18–78	17	12.7 ± 3.0	8–17
AUD (ALC)	43.9 ± 10.0	24–66	17	11.4 ± 3.0	8–17
Depression (DEP)	47.2 ± 11.8	21–63	20	11.6 ± 2.3	8–17
Total	46.0 ± 13.6	18–82	71	12.0 ± 2.8	8–17

No differences: * $p = 0.11$; ** $p = 0.17$, † Pearson's chi-squared test: $\chi^2 = 0.697929$, df = 3, $p = 0.873691$

The mental state of the subjects

Data characterizing the mood and stress of the subjects are presented in Table 2.

Table 2. **Data characterizing the mood and stress of the subjects**

	Mood		BDI		HDRS		Stress level	
	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD	Range
Groups								
Control (PAN)	5.6 ± 0.7	4–7	3.0 ± 3.2	0–12	0.9 ± 1.5	0–7	2.0 ± 1.5	1–5
Control (CON)	5.4 ± 0.8	3–7	3.6 ± 3.2	0–13	1.1 ± 1.7	0–7	3.3 ± 1.2	1–6
AUD (ALC)	4.7 ± 1.1	3–7	10.6 ± 7.1	0–29	2.9 ± 2.1	0–7	3.5 ± 1.5	1–7

table continued on the next page

	Mood		BDI		HDRS		Stress level	
	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD	Range
Groups								
Depression (DEP)	3.4 ± 1.2	1–6	28.9 ± 11.9	7–54	21.1 ± 6.4	9–32	4.5 ± 1.3	2–7
Total	4.8 ± 1.3	1–7	11.5 ± 12.7	0–54	6.5 ± 9.2	0–32	3.3 ± 1.6	1–7
p*	H = 67.17 p = 0.001		H = 97.96 p = 0.001		H = 106.46 p = 0.001		H = 53.10 p = 0.001	

*different from all the other groups; p <0.001

The proportion of specific memories

The descriptive statistics of the percentage (calculated in relation to all answers) of specific memories are presented in Table 3.

Table 3. **The percentages of specific memories in groups**

	Percentage of specific memories					
	Total		Positivecuewords		Negative cue words	
Groups	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD	Range
Control (PAN)	56.8 ± 19.4	16.7–100.0	57.3 ± 23.2	16.7–100.0	56.4 ± 23.5	0.0–100.0
Control (CON)	48.9 ± 20.0	16.7–91.7	47.9 ± 26.0	16.7–100.0	50.0 ± 22.0	0.0–83.3
AUD (ALC)	25.6 ± 20.9	0.0–75.0	23.1 ± 24.4	0.0–83.3	28.2 ± 23.3	0.0–83.3
Depression (DEP)	19. 0 ± 13.9	0.0–58.3	17.1 ± 17.3	0.0–66.7	20.9 ± 18.2	0.0–66.7
Total	37.6 ± 24.3	0.0–100.0	36.3 ± 28.2	0.0–100.0	38.9 ± 26.2	0.0–100.0

The examined groups differed in terms of the percentage of specific memories (H (3, N = 156) = 68.787; p <0.001). Multiple comparisons showed significant differences between both control groups and both study groups (p <0.001) – the subjects from the study groups recalled significantly less specific memories. A similar pattern of results occurred for both positive (H (3, N = 156) = 57.287; p <0.001) as well as negative cue words (H (3, N = 156) = 50.398; p <0.001). Both control groups and both clinical groups did not differ statistically significantly between themselves.

In conclusion: compared to people in both control groups, people in the clinical groups have difficulty recalling events in a specific manner. This also occurs in the case of negative cue words.

The proportion of non-specific memories

The descriptive statistics of the percentage of types of non-specific answers are presented in Table 4.

Table 4. **The percentages of non-specific memories in groups**

	"Extended" memories		"Categorical" memories		Semantic associations		"The same event"		No response	
	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD	Range	Mean ± SD	Range
Groups										
Control (PAN)	17.9 ± 16.4	0.0–83.3	7.3 ± 8.4	0.0–25.0	7.7 ± 8.8	0.0–33.3	1.5 ± 3.2	0.0–8.3	8.8 ± 9.9	0.0–25.0
Control (CON)	16.7 ± 14.0	0.0–58.3	7.7 ± 10.4	0.0–33.3	13.5 ± 13.1	0.0–50.0	1.9 ± 3.6	0.0–8.3	11.3 ± 11.4	0.0–41.7
AUD (ALC)	26.7 ± 17.2	0.0–66.7	15.8 ± 12.4	0.0–33.3	17.7 ± 17.9	0.0–58.3	3.6 ± 6.3	0.0–25.0	10.5 ± 12.6	0.0–58.3
Depression (DEP)	24.8 ± 14.4	0.0–58.3	8.8 ± 10.8	0.0–50.0	23.7 ± 17.9	0.0–66.7	4.1 ± 6.9	0.0–25.0	19.7 ± 22.0	0.0–100.0
Total	21.5 ± 16.0	0.0–83.3	9.9 ± 11.0	0.0–50.0	15.7 ± 15.9	0.0–66.7	2.8 ± 5.3	0.0–25.0	12.6 ± 15.2	0.0–100.0

The groups differed in percentage of "extended" memories ($H(3, N = 156) = 12.94474$; $p < 0.005$). Multiple comparisons showed significant differences between ALC and CON groups ($p < 0.005$) – the first group recalled more "extended" memories.

There were also significant differences in terms of "categorical" memories (H (3, N = 156) = 13.63923; $p < 0.005$). The ALC group recalled more such memories than both control groups (each time $p < 0.05$). Significant differences in terms of "semantic associations" (H (3, N = 156) = 20.10134; $p < 0.001$) were associated with higher results in the DEP group than in the PAN group ($p < 0.001$).

The highest average percentage of "extended" and "categorical" memories had the ALC group in comparison with the other groups. The DEP group, on the other hand, obtained the highest results in "semantic associations", "the same event" and "no response".

The affective valence of memories

Figure 1 and 2 show the number of memories for a given person, which were assessed on a 7-point semantic scale of pleasure-distress respectively above and below the median of 4 points.

The examined groups differed in the number of positive memories ($H(3, N = 155) = 17.46147$; $p < 0.001$). Multiple comparisons showed significant differences between both control groups and the DEP group – people suffering from depression recalled

significantly fewer memories rated as pleasant than healthy individuals (p <0.05) and people experiencing physical ailments, i.e., the CON group (p <0.01). The ALC group did not differ significantly from the others.

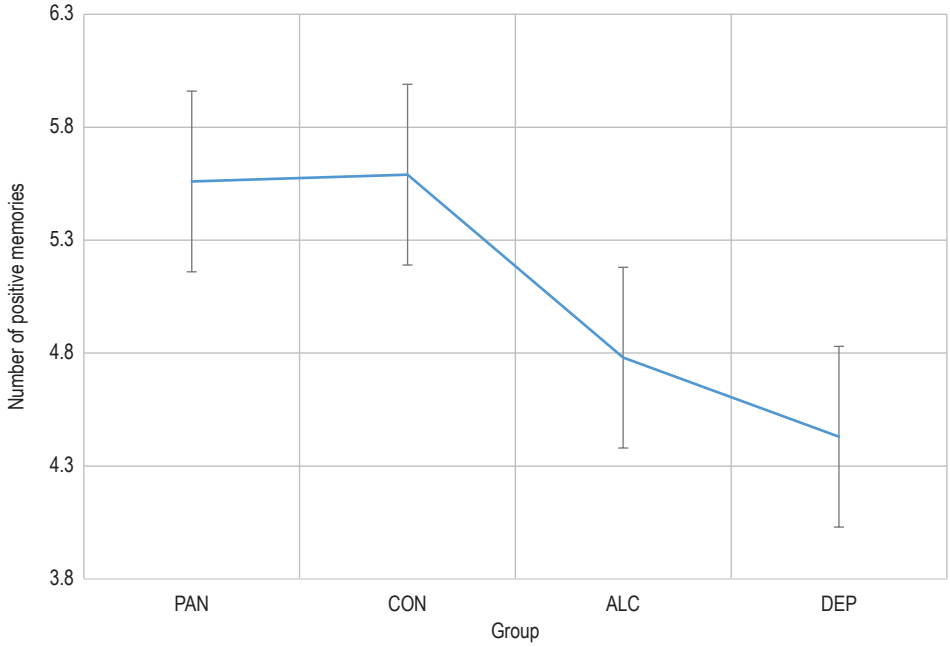

Figure 1. **The average number of positive memories in groups**

The analysis of differences between groups in the number of negative memories showed results on the border of statistical significance (p = 0.067) with the highest rank-sum (Σ = 3624.5) and the average rank (M = 92.9) in the ALC group.

The memories recalled by subjects from clinical groups are more affectively burdened than in people from control groups, but differently in each of these disorders. The DEP group is characterized more by a lack of positive memories, while the ALC group – by a substantial number of negative ones.

Correlations with the severity of the disease

The results in both depression questionnaires correlate (negatively) with: the number of positive memories, the percentages of specific memories regardless of their emotional sign, and (positively) the percentage of "extended" and "semantic associations" responses, which do not constitute memories *sensu stricto*. The results of the

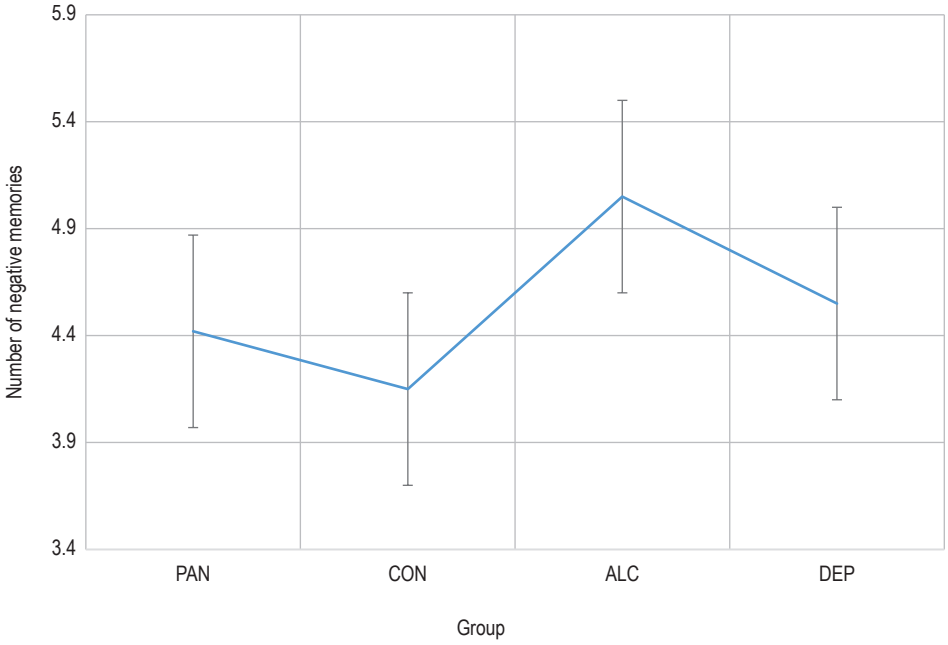

Figure 2. **The average number of negative memories in groups**

bMAST show a positive correlation with a decrease in specificity and the number of negative memories. The results are presented in Table 6.

Table 6. **Spearman's rank correlation coefficients of the bMAST, BDI and HDRS questionnaires with the number of memories and their specificity**

Variable	bMAST	BDI	HDRS
Number			
Positive memories*	-0.100	-0.272†	-0.299†
Negative memories*	0.215†	0.154	0.099
Percentage			
Specific memories (all)	-0.174†	-0.443†	-0.510†
Specific positive memories**	-0.151	-0.396†	-0.470†
Specific negative memories**	-0.157	-0.388†	-0.431†
Extended memories	0.202†	0.172†	0.175†
Categorical memories	0.269†	0.043	0.006
Semantic associations	-0.070	0.265†	0.310†

table continued on the next page

"The same event"	-0.001	0.085	0.168†
No response	-0.139	0.085	0.179†

* "Positive" and "negative" – in the sense of results obtained in the semantic scale of pleasure-distress, respectively above and below the median of 4 points.

** "Positive" and "negative" – in the sense of response to positive and negative cue words.

† $p < 0.05$

Discussion

Specificity of memories

The presented study confirmed the presence of OGM in both clinical groups (only 19.0% of memories were specific in the DEP group, 25.6% in the ALC group). In the area of non-specific responses, AUD is associated with errors occurring higher in the hierarchy, i.e., closer to the correct specific response ("extended" and "categorical" memories) than depressive disorders, in which the responses that are *de facto* not memories (semantic association, same event, no response) appear more often. Thus, in the DEP group the process of extracting memories was probably disturbed at an earlier stage than in people with AUD [30].

The impairment of recalling memories is global, it also applies to negative stimuli. This is somewhat contrary to "common sense" expectations. Both diseases are associated with negative emotional states, potentially activating memory material with the same emotional sign, and the depressed mood should also facilitate the accurate processing of negative memory material [31]. However, this is not the case – people from clinical groups also had a deficit of unpleasant reminiscences, which was confirmed in earlier studies [32].

Affective sign of memories

Clinical groups evaluated the past more negatively than controls. The *post hoc* analysis of the number of affectively marked memories indicated differences in positive memories in the DEP group compared to the control groups, and in the range of negative memories on the border of statistical significance – with the highest results for the ALC group. Thus, the pattern of results for clinical groups is not the same – it includes a reduced number of positive memories in people with depression, and – probably – increased number of negative memories in people with AUD. To our knowledge, results concerning AUD are new but require confirmation on larger material.

Overgeneral memories and the affective sign of memories in episodes of depression

Presence of OGM in depression is only confirmation of numerous previous reports [2, 33–37]. Deficits in the processing of positive material in depression were also reported but to a lesser extent [2, 22]. Taylor and Brown described the so-called positive illusions. They constitute the beliefs of healthy people, such as overly positive self-esteem, excessive sense of control and exaggerated optimism. Depression is associated with the reduction in the occurrence of these distortions [38]. The hypothesis of "depressive realism" postulates that people with depression draw more real, because deprived of these illusions, conclusions than healthy people. However, this has an adverse effect on functioning, resulting from a negative assessment of the past, which impairs motivation [39, 40]. Specific positive memories protect against depressive episodes [41].

Overgeneral memories and the negative affective sign of memories in alcohol use disorder

In most studies to date, dependent drinkers have generated less specific memories than non-addicts. They also usually had depressive symptoms [11]. By choosing groups of patients free from coexisting mood disorders, achieving the same result (i.e., an increase in OGM), we can attribute the results to AUD itself. This is indirectly confirmed by the positive correlation of the bMAST scores with a decrease in specificity. It should be assumed that there are qualitative differences in the functioning of memory between these two disorders, as evidenced by the results of the studies indicating the persistence of OGM despite the remission in mood disorders and the relatively rapid improvement in the case of AUD [7, 13].

The occurrence of OGM in AUD has been found in several studies, sometimes – unfortunately – without separating the symptoms of addiction and depression. In one study, alcoholics were tested twice (on admission for detoxification and after three weeks). The level of specificity of memories recalled in response to positive and aggressive (but not negative) cue words enabled predictions of affective changes in subjects – the more specific memories, the greater the reduction of depressive symptoms. Determining OGM levels can also help decide whether to include antidepressants during detoxification and treatment of dependent drinkers [10].

OGM-generating alcoholics, when managed to gain access to specific memories, filled them with the same amount of detail as controls. It is postulated that in AUD, difficulties mainly concern access to memory material, and not its different content, which is attributed to changes in the functioning of the frontal lobes associated with alcoholism [12, 30]. Moreover, the low specificity of memories in AUD may also be temporary. People with AUD after recent detoxification, 6 months abstinence and healthy controls were compared. People after detoxification recalled less specific

memories than other groups with a similar level of specific memories. This indicates an improvement in OGM after 6 months of abstinence. A negative relationship was found between the specificity of memories and the awareness of the severity of addiction. Thus, OGM may be associated with difficulties in assessing one's situation in AUD, and, consequently, with the decision not to undergo treatment [13]. In addition, the memories of alcoholics have more often contained references to alcohol, have had a greater emotional intensity and a negative affective sign [14].

Our study also shows a deterioration in memory specificity in AUD, which is related to addiction itself, not depression. A direct comparison of people with AUD and depression indicates that in the former the specificity of memory is slightly better, as well as that the affective pattern of memories remains distinct.

Overgeneral memories and somatic diseases

Comparing both control groups, the number of specific responses obtained from healthy individuals was each time slightly higher than that obtained from patients awaiting surgery. This very cautiously allows us to suspect that factors such as disease, hospitalization and related stress slightly disturb the mechanism of constructing specific memories, but this issue requires research using larger groups.

The studies assessing the relationship between OGM and somatic diseases and (accompanying) stress are few. For example, people with tinnitus, depression and healthy people were compared. A similar, reduced percentage of specific memories was present in clinical groups, but they differed in the type of non-specific responses. People with depression had more OGM than the control group, while participants experiencing tinnitus – more responses that were not memories. It is not clear, however, whether tinnitus alone or associated stress contributes to a decrease in specificity [42]. The reduced specificity of memories and their slower recall in patients with chronic pain may, in turn, be explained by the higher severity of depression and anxiety [43].

Potential clinical consequences

For clinicians, information on the severity of OGM may be helpful in the process of diagnosis and assessment of prognosis. The described changes in AM may stimulate *circulus vitiosus* and thus destabilize the healing process and promote relapses. Therefore, it seems important for diagnosticians and therapists to be aware of distortions in the functioning of AM and that they can be understood by the patient, e.g., through psychoeducation or other therapeutic activities. In particular, problems such as a tendency to move away from everyday matters, overly general and abstract thinking, which are "breeding ground" for depression, should be cognitively restructured.

In the field of AUD, one can try to transform dysfunctional patterns conducive to the feeling of the ineffectiveness of one's actions, especially those supporting the negative pole of the self-image. Work on this area can potentially help change dysfunctional cognitive patterns and thus contribute to a more realistic self-perception [44].

The first reports of intervention related to increasing specificity – Memory Specificity Training (MEST), regarding mood disorders and PTSD, seem promising [45, 46].

Limitations

The most important limitation of the study is the use of relatively simple and subjective measures of mood and stress, which do not preclude dissimulation. For patients with a depressive episode, no criteria of the course (bipolar or unipolar) were used.

Conclusions

1. People suffering from a depressive episode and AUD without symptoms of depression recalled a significantly smaller percentage of memories filled with details than those from the control groups. This applies not only to positive but also to negative cue words.
2. People suffering from a depressive episode recalled fewer positive memories than control groups.

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