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Autobiographical memory deficits in patients with depression follow a temporal distribution

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ABSTRACT

Autobiographical memory deficits are known in depression. The temporal distribution thereof across periods of life has rarely been considered yet. Autobiographical memories for 5 life periods were investigated in 27 depressed in-patients and compared to 31 matched healthy controls using the *Bielefelder Autobiographisches Gedächtnis Inventar*. Depressed patients reported significantly less details in memories dating from childhood to 30 years, correlating with severity of depression. Memories from childhood and recent periods were less positive in depressed patients. Thus, we found a distinct pattern of autobiographical memory deficits in depressed patients. Possible etiological factors, however, need further investigations.

1. Introduction

Depression is associated with impairments of various cognitive functions like episodic memory, executive function, and processing speed (McDermott and Ebmeier, 2009). Impairments of autobiographical memory (AM) in depression (Liu et al., 2013; Williams et al., 2007) play a particular role because AM stores information relating to the self. The self is based upon memories of past events and also guides access to past personal information that interacts with current states of self (e.g. emotion, values, goals) (Conway, 2005; Barry et al., 2006).

The vast majority of studies investigating AM in depression used the AM test proposed by Williams and Broadbent (1986), an adaptation of the procedures introduced by Galton (1883) as well as Crovitz and Schiffman (1974), which asks participants to report specific memories in response to cue-words. A memory is considered specific when it corresponds to a single event taking place at a particular time and place, usually within the course of one day. One critical aspect of this procedure is that it does not take into account the time of occurrence of the selected events. However, the remoteness of events can possibly alter several aspects of memories retrieved such as their vividness, level of details, or specificity (Piolino et al., 2006). To our knowledge only a handful of studies used a procedure taking this limitation into account and asked participants to retrieve memories from different periods of life (Gidron and Alon, 2007; Lemogne et al., 2006; Warren and Haslam, 2007). Surprisingly, only two studies reported results relating to lifetime periods. Gidron and Alon (2007) found a significant inverse correlation of depressive symptoms and specificity of memories for adolescence cue-words. However, they did not include a healthy control group. Ahlsdorf (2009) compared 30 elderly patients with mild depressive episodes (mean age 68 ± 6.6 years) to patients suffering from mild cognitive impairment, Alzheimer's disease and to controls. Statistical analyses comparing the four groups revealed no significant effects of depression on overall AM and on AM of distinct lifetime periods (Ahlsdorf, 2009; for English reference see Urbanowitsch et al., 2013).

Considering the high prevalence of early life stress in patients with depression (Turner and Butler, 2003; Kessler et al., 2010) and the impact of childhood trauma on cognitive performance (Saleh et al., 2016) as well as on severity of depression (Tunnard et al., 2014), we think it is relevant to examine the temporal distribution of AM impairment in depression as particular periods of life may be characterized by more pronounced deficits. It is moreover possible, that particular periods of life, especially those with higher impact on self-construction, are more affected in states of depression. This was the focus of the present study in which in-patients with severe depression and healthy matched controls were investigated. We used the *Bielefelder Autobiographisches*

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Gedächtnis Inventar (BAGI©; Fast and Fujiwara, 2000), which assesses autobiographical memory of five different lifetime periods from early childhood until recent past. Thereby it allows for investigation of episodic autobiographical memory by asking for free recalled memories of each episode within a semi-structured interview. We hypothesized that memories dating from adolescence and early adulthood which are most critical for development of self-images and self-schema, referred to as the reminiscence bump (Rathbone et al., 2008), may be particularly impaired in patients with severe depression.

2. Methods

This data stems from a larger study, of which a subgroup analysis concerning verbal memory assessed with the California Verbal learning test (CVLT) before and after electroconvulsive therapy was published before (Biedermann et al., 2016). We here present data of the *Bielefelder Autobiographisches Gedächtnis Inventar* (BAGI; Fast and Fujiwara, 2000) which was performed in 58 participants: 27 patients suffering from a major depressive episode according to DSM-IV (19 females, 8 males, aged 45.7 ± 14.1 years), and 31 healthy controls (20 females, 11 males, age 46.4 ± 13 years). BAGI and other test procedures were done before electroconvulsive therapy cycle or escalation of pharmacotherapy started. Control subjects had negative lifetime histories of psychiatric illness including substance abuse and were matched for age, gender, education, nicotine and alcohol consumption and completed the same neuropsychological tests as patients. Patients were recruited on admission to the Central Institute of Mental Health in Mannheim, Germany. At the point of investigation patients were treated with antidepressants (SSRI $n = 7$; SSRI + mirtazapine = 2; TCA n = 1; SSRI + TCA = 1) and benzodiazepines ($n = 16$), mood stabilizer + antidepressant ($n = 4$), and atypical antipsychotics in a few cases ($n = 6$). The study was approved by the Ethics Committee of the Medical Faculty Mannheim of the University of Heidelberg, Germany. All clinical investigations were conducted considering the Declaration of Helsinki. Fully informed written consent was obtained from all participants.

The BAGI is a semi-structured interview, asking for autobiographical memory over four to five lifetime periods (early childhood until primary school, primary school, adolescence, early adulthood (end of school until the age of 30), recent past), depending on the age of the subject (four episodes for subjects < 30 years, five episodes for those > 30 years). Participants are asked to give semantic information (e.g. own address or name of school) and to retrieve two specific episodes for each lifetime period of which at least one is meant to be emotionally meaningful to the participants. Thereafter, one of these episodes is selected and reported in detail by the subject according to 11 pre-defined categories of details (e.g. exact age, time of day, people involved). Accordingly, a score between 0 and 11 can be reached. Thereafter, subjects have to rate the valence of the single episodes in a dichotomous way: whether they were associated with emotions (yes or no) and whether these were positive or negative. During the whole procedure participants are equipped with a list of generic events (e.g. first day in school, marriage, illness of a child) as well as feelings (e.g. joy, sadness). Moreover, Psychopathology and neuropsychological performance were assessed using Beck Depression Inventory (Hautzinger et al., 1995), and Mini Mental-Status-Examination (MMSE; Kessler et al., 2000). The Hamilton Depression Scale (HAMD; Hamilton, 2005) was performed in the patient group only.

2.1. Statistics

Differences in demographical data and neuropsychological tests (patients vs. healthy controls) were either tested with $\chi 2$-tests or independent two-sided *t*-tests, as appropriate. Autobiographical memory performances were analyzed using an ANCOVA for repeated measures with group as between-subject factor and period (early childhood vs. primary school vs. adolescence vs. early adulthood vs. recent past) as within-subject factor and age as covariate. Post hoc comparison analyses were based on Tukey's test.

Pearson product-moment correlation coefficients were computed to analyze the relationship between BAGI and symptom severity in depressed patients only.

Significance was set at $p < 0.05$. Statistical analyses were performed by using the 20.0 version of the PASW Software (formerly SPSS).

Table 1
Sociodemographic parameters and results of Hamilton Depression Scale (HAMD), Beck Depression Inventory (BDI) and Mini Mental-Status-Examination (MMSE) in patients and controls.

	Patients ($n = 27$)	Controls ($n = 31$)
Mean Age (± STD)	45.7 ± 14.1	46.4 ± 13
Gender		
Female	19	20
Male	8	11
Education		
Secondary School	12	16
High school	15	15
Family history for psychiatric diseases		
Positive	13	4*
Negative	14	25*
Missing	0	2
HAMD	26.3 (± 6.5)	
BDI	36.4 (± 10.7)	2.3 (± 3.0)*
MMSE	28.9 (± 2.1)	29.9 (± 0.4)*

STD: standard deviation.
* indicate significant differences between patients and controls at $p < 0.05$.

3. Results

Sociodemographic parameters of patients and controls are presented in Table 1. Significantly more patients than healthy controls reported a positive family history for psychiatric diseases ($p = 0.008$). BDI was significantly higher ($p < 0.001$), MMSE was significantly lower ($p = 0.022$) in patients than controls (Table 1).

There were no significant differences regarding semantic knowledge of the single episodes. Regarding memory specificity, patients retrieved overall significantly less specific episodes than controls ($F(1,56) = 10.66$; $p = 0.002$). The number of memory details was significantly lower in patients than in the control group ($F(1,56) = 11.5$; $p = 0.001$) and a significant effect of period ($F(4,52) = 11.32$; $p < 0.001$) was observed. Although the interaction between group and period was not significant ($F(5,52) = 1.98$, $p = 0.100$), we conducted post hoc comparisons that revealed significant group differences in the time periods of primary school ($p = 0.027$), adolescence ($p = 0.001$), early adulthood (end of school until the age of 30) ($p = 0.019$) but not in the most remote ($p = 0.660$) and the most recent ones ($p = 0.187$; Fig. 1). Regarding the overall valence of memories, patients retrieved less positive memories than controls but the difference did not reach significance ($F(1,56) = 3.90$, $p = 0.053$). A significant effect of period ($F(4,52) = 4.97$, $p = 0.001$) and a significant interaction between group and period ($F(5,52) = 3.02$, $p = 0.02$) were found for valence of memories. Post hoc analyses revealed significantly less positive memories in patients than controls for childhood ($p = 0.005$) and recent periods ($p < 0.014$, Fig. 1).

In order to check the possible influence of benzodiazepine on memory performance, secondary analyses were performed after exclusion of patients taking benzodiazepines. Results remained the same when analyzing patients without benzodiazepine medication.

Pearson correlation showed a significant inverse correlation between symptom severity in depressed patients (HAMD) and total details BAGI score over all periods ($r = -0.446$; $p = 0.017$) as well as with number of details in primary school ($r = -0.525$; $p = 0.005$) and in early adulthood ($r = -0.484$; $p = 0.011$). Using partial correlation