Autobiographical memory deficit in anorexia nervosa: Emotion regulation and effect of duration of illness

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Abstract

Emotional deficits in anorexia nervosa can be expressed in autobiographical memory recall. The aim of this study is to test whether deficits in autobiographical memory exist in anorexic patients and concern specifically negative or positive emotional valence. Moreover, it is unclear whether these deficits are dependent upon comorbid aspects (depression, alexithymia, and anxiety) or upon illness duration. Anorexic patients ($n=25$) were compared to healthy volunteers based on their clinical assessment, explicit memory test score, and autobiographical memory test score. The study makes use of the autobiographical test of Williams and Scott, which involves specific emotional cues to elicit memory. Anorexic patients recalled more general memories than controls in autobiographical memory test, but had no deficit in explicit memory test. This pattern, observed both for negative and positive cues, was neither related to depression or alexithymia, nor to anxiety severity, but increased significantly with illness duration. These results show that anorexic patients are characterized by relative difficulty in the integration of both negative and positive emotional experiences, and that this impairment is reinforced by illness duration.
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Introduction

Adolescent anorexic patients are characterized by identity disorders that are consolidated by environmental factors [1,2], specific familial interactions [3–5], and cognitive, emotional, and neuropsychological impairments [6–9]. Some studies have reported that, in acute state, anorexic patients present impairments in short-term verbal and visual visuospatial construction problem solving and

reaction time [6,10]. The most robust neurocognitive deficit in anorexia nervosa relates to attentional deficits involving selective attention, inhibition functions, difficulties in set shifting ability, and inability to change past patterns of thinking [11–14], which persists even after recovery [15]. Nevertheless, neurocognitive assessment in anorexic patients presents some general limitations, namely, that most studies have used a broad range of neuropsychological tools and have involved patients with varied clinical characteristics [9], such as the clinical severity and duration of illness.

In addition, as nutritional status and weight loss bear little relationship with the cognitive scores of these patients [10], it has been suggested that cognitive troubles could be

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rather dependent on emotional processes than on neuro-cognitive impairments [16–18]. Many authors have suggested that women with eating disorders have "emotional dysregulation," which often manifests itself as a deficit in modulating emotions [16,19–24] that could lead to cognitive impairments. An inability to accurately recognize, label, and respond to different emotional states is thought to be at the core of the development of anorexia nervosa [21,24,25] or other eating disorders [26].

Emotional impairments in anorexic patients were observed in emotion recognition, facial expression, and visual or prosody recognition tasks [16,18,27]. In particular, anorexic patients poorly recognize negative emotions in facial expression [27]. Emotional troubles appear in situations wherein adolescents are in conflict or try to avoid it [28,29]. Moreover, these patients are particularly prone to silencing negative affect and avoid communication involving unpleasant affect [30–32]. These emotional dysregulations can be related to alexithymia, which is largely observed in eating disorders [33–37] and is nowadays recognized as an impairment in cognitive components of emotional response systems (subjective awareness and verbal reporting of feelings) and in interpersonal regulation of emotions [37]. Alexithymia in eating disorders is associated with interpersonal distrust and lack of introceptive awareness, but is not related to drive for thinness and body dissatisfaction [24,25,37]. Starvation, hyperactivity, binging, and purging can be thought of as attempts to regulate undifferentiated emotional states [25,37].

Anorexic patients use cognitive and behavioral strategies (rituals, purging, or exercises) in order to avoid or attenuate negative affect. Another cognitive avoidance strategy could also consist in modifying access to autobiographical emotional memories by retrieving memories less specifically [38,39]. A hypothesis suggested by Williams [40] and supported by empirical tests of Raes et al. [38] is that individuals who have experienced early negative events or trauma learn that, by retrieving painful memories in a less specific way, they minimize associated negative emotions. Thus, during adolescence, abnormalities of personal identity could be related to specific impairment in memory access stemming from a cognitive strategy meant to quench negative emotions [39].

Table 1
Group description (age and duration of the illness are given in years, height is given in centimeters, weight is given in kilograms, and BMI is given in kilograms per square meter) average values; standard deviations are given in parentheses

	Anorexic patients (n=25)	Controls (n=25)
Age	23.7 (±6.4)	23.56 (±4.87)
Height	164.4 (±5.38)	167.1 (±5.86)
Weight	40.9 (±4.5)	60.97 (±8.4)
BMI	15 (±1.26)	21.54 (±1.92)
Duration	5.96 (±4.4)	–

Table 2
Average results of clinical assessment for the anorexic group and the control group

	Anorexic patients	Controls	t test
EDI	102±28.5	32.72±25.3	t=8.82, P<.001
TAS	81±9.8	55.2±14.2	t=7.78, P<.001
Depression	19.1±7.4	4.16±3.3	t=9.4, P<.001
A-State	53.8±14.87	36.12±9.7	t=5.1, P=.001
A-Trait	64.6±8.31	40.6±10.23	t=9.74, P<.001

Autobiographical memories, considered as transient mental constructions, are generated from a database of autobiographical knowledge, which is hierarchically organized from specific to general memories [41,42]. It has been shown that acquired autobiographical knowledge is organized during adolescence [43–46] and shapes the sense of personal identity [42,44]. Only a few studies have examined autobiographical memories in adolescent psychopathology. These studies have mainly investigated depression [47], sexual abuse [48,49], or trauma-related disorders [39], and have stressed the relation between negative events and memory overgeneralization. They thus suggest, as in adult studies, that general autobiographical memories would attenuate the effects of negative affect [38,50]: the higher is the intensity of trauma, the lower is the specificity of memories.

Up to now, only one study has assessed autobiographical memories in anorexic patients (with sexual abuse) and has reported impairments characterized by an increase in general memory recall [51]. This deficit in specific autobiographical memories would correspond to the avoidance of negative emotional experiences, which would lead to impairment of personal identity. This cognitive avoidance strategy may be generalized to addictive behavior and anorexic patients. The aim of the present study is to test whether deficits in autobiographical memory exist in anorexic patients and concern particularly negative or positive emotional valence. We hypothesize that anorexic patients should be characterized by negative bias toward negative autobiographical memories as assessed by the autobiographical memory test elaborated by Williams and Scott [52] and adapted in French by Puffet et al. [53].

In addition, we speculate that avoidance strategy could be reinforced by illness duration. Illness duration effects have been observed for autobiographical memories in depression [54,55]. The relationship between depressogenic information processing styles and dysphoric affect is stronger in patients who have already experienced a depressive episode than in first-episode depressed subjects [56]. For example, the study of Mackinger et al. [55], which argues that autobiographical memory deficit is a consequence of depression, shows that women with a history of major depression retrieved more categorical descriptions with negative cue words than women without any history of depression. Moreover, in bulimic patients, negative bias evolves according to subjects' age [57]. It would, therefore, seem that cognitive deficit
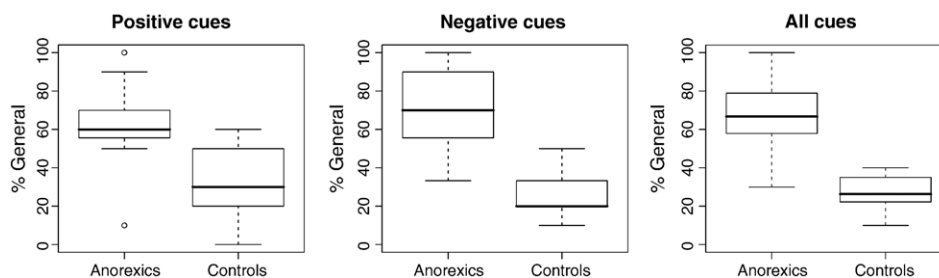
Fig. 1. Box-and-whisker plots of the percentage of general memories for all, negative, and positive cues.

Materials and methods

Groups

Twenty-five inpatients were selected according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV) criteria for anorexia nervosa, restrictive type (i.e., without the binge eating, vomiting, or laxative abuse of bulimics) [58]. Anorexic patients had a body mass index (BMI) ranging from 12 to 15.5. All patients, after giving informed consent, were included in the sample. The participation of patients in the study was validated by an ethical committee. Group characteristics are given in Table 1.

All patients received the same supportive psychotherapy, while only a few of them (five patients) received antidepressant drugs (serotoninergic agonists). Diagnostic assignment was determined by the consensual judgment of two professionals (a psychiatrist and a clinical psychologist). Exclusion criteria were as follows: neurological disorders, comorbid posttraumatic stress disorders, intellectual deficits, and a recent history of drug or alcohol abuse. Axis II of the DSM-IV related to personality disorders was not assessed. All selected patients participated in the study.

Twenty-five healthy young women joined the experiment as a control group. Control participants were health students recruited at a university or college. They voluntarily participated in the experiment. All subjects were paired according to age, sex, and educational level. Control subjects have no self-reported previous history of psychiatric, drug abuse, or eating disorders.

Clinical assessment

Clinical assessment was performed during the first week of hospitalization: depression was assessed with the Beck Depressive Inventory [59,60], trait and state anxiety were assessed with the STAY a and b [61], and alexithymia was assessed with the Toronto Alexithymia Scale (TAS) [62–64]. The Eating Disorders Inventory (EDI) [65] by Garner et al. was filled out by all patients before memory assessment. The clinical characteristics of the groups are given in Table 2. In addition, a verbal list learning memory test (The Buschke–Fuld SRT) was administered to test for global verbal memory performance, including storage, retention, and retrieval of spoken words abilities. In this test, 10 unrelated words are read to subjects at a rate of one word every 2 s. Immediately after, subjects are asked to recall the entire list. Those words that are not recalled on the first trial are read to subjects, and, immediately after, subjects are asked to recall the entire list. This procedure is repeated for six trials (short-term recall test). Then, after a delay, subjects are asked to recall the original list (delayed recall test). High short-term memory scores indicate memory deficits.

Autobiographical memory test

Autobiographical memory was assessed with the memory test of Williams and Scott [52]. We used the French translation of Puffet et al. [53]. This test includes 20 cue words: 10 with a negative valence and 10 with a positive one. Positive and negative words are read alternately.

Table 3
Statistical results for autobiographical memories (average values; standard deviations are given in parenthesis)

	Anorexic patients (*n*=25)	Controls (*n*=25)	*t* test (*ddl*=24)
All general responses	12.96 (±3.26)	5.48 (±1.64)	*t*=10.57, *P*<001
All specific responses	6.24 (±3.05)	14.24 (±1.56)	*t*=12.29, *P*<001
Negative cues (general responses)	6.96 (±2.07)	2.44 (±1.12)	*t*=9.93, *P*<001
Negative cues (specific responses)	2.72 (±1.84)	7.32 (±1.28)	*t*=11.27, *P*<001
Positive cues (general responses)	6.04 (±1.84)	3.04 (±1.65)	*t*=6.6, *P*<001
Positive cues (specific responses)	3.6 (±1.68)	6.92 (±1.66)	*t*=7.15, *P*<001

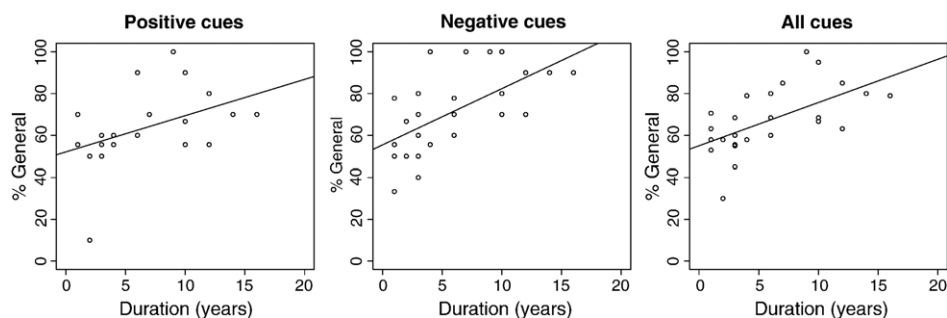Comparisons between groups are performed using *t* test.

Fig. 2. Correlations between general memories for all, negative, and positive cues, and duration of illness.

Subjects are asked to evoke specific memories in response to the cue word. Subjects have 60 s to give their response. Specific memories correspond to a precise event (e.g., to the cue "hurt," the memory of the mother's death is a specific memory). In contrast, general memory corresponds to a general class of events (e.g., to the cue "happy," the response "in my childhood, I lived happily" is considered general memory).

Data analysis

Subjects could respond in three possible ways to each cue word: by giving either a specific response, or a general response, or no response at all. The number of absence of response was too small (min=0 and max=3 for nonchronic; min=0 and max=2 for chronic; min=0 and max=2 for controls) to be taken into account. Thus, the number of general responses was normalized by the total number of expressed responses for each subject. The percentage of general responses:

$$\frac{\text{Number of general responses}}{\text{Number of general responses} + \text{Number of specific responses}} \times 100$$

was thus taken as our measurement. Here, we only present the results for general memories, as few specific responses were complementary to the overwhelming majority of general ones.

Statistical analysis

Significant group differences for parametric variables were evaluated using two-tailed group t test (statistical threshold, $P=.05$).

Results

Clinical assessment

The average clinical assessment and statistical results for the comparison between the two groups (t test) are given in Table 2.

For all clinical scales (eating behavior, depression, anxiety, or alexithymia), we observed significantly higher scores for anorexic patients than for controls.

Recall tests

No significant differences were observed for the recall test (The Buschke–Fuld SRT) or for the immediate recall test (anorexic group: 4.88±2.3; control group: 5.44±2.35; t test, $t=0.92$, $ddl=24$, $P=.36$), nor for the delayed recall test (anorexic group: 13.36±2.23; control group: 12.36±3.04; t test, $t=1.26$, $ddl=24$, $P=.22$).

Autobiographical test

Results are depicted in Fig. 1, and the values of statistical descriptions and tests are given in Table 3. In the three situations taken into account (all cues, negative cues, and positive cues), a significant effect between the two groups was observed. Anorexic patients had a higher percentage of general memories than the controls.

Correlations

Significant correlations were observed between the duration of the illness and the rate of general memories for all categories of emotional cues (Fig. 2) (all cues: $S=942$, $P<.001$, $\rho=0.638$; negative cues: $S=883$, $P<.001$, $\rho=0.660$; positive cues: $S=1347$, $P<.016$, $\rho=0.482$). No significant correlation was found between the percentage of general memories and alexithymia scores (all cues: $S=2258$, $P=.528$; negative cues: $S=2370$, $P=.672$; positive cues: $S=2275$, $P=.549$) or depression scores (all cues: $S=3029$, $P=.429$; negative cues: $S=3139$, $P=.319$; positive cues: $S=2646$, $P<.934$).

Discussion

Our study shows that anorexic patients are characterized by an overgeneralization of autobiographical memories for both positive and negative memories, and that this deficit is positively correlated with illness duration. Observed deficit is specifically related to emotional processes as verbal

memory performance is not impaired. Moreover, both positive and negative memories are impaired, suggesting a general impairment in the access to emotional memories in anorexic patients. Thus, anorexic patients are prone to suppress or control not only negative affect [30] but also positive affect [27].

Overgeneralization of autobiographical memories in anorexic patients with sexual abuse [51] and positive correlation between this characteristic and the number of retrieved general negative memories [48,51] have been reported. According to the hypothesis of affect regulation [50], general memories allow patients to diminish the affective impact of a negative event [38]. The effect of sexual abuse was not specifically taken into account in the present study. We show that this possible "protection" effect due to general memories is observed not only for negative emotional memories but also for positive ones. The emotional deficit of anorexic patients is thus more global and affects the whole emotional experience. This supports the hypothesis that eating disorders are emotional regulation disorders [24,25,37]. The difference observed between our results and those of Dalgleish et al. [51] could be explained by the effect of sexual trauma, which exacerbates negative bias as observed in adults [48] and is comparable to observations in patients with posttraumatic stress disorder [39].

Emotional deficits observed in the recognition of emotion from facial expression and vocal tone in anorexia [27] are supposed to contribute to poor interpersonal communication. Deficits in the perception of self or one's own feelings [27,30,66–69] could be the final outcome of early poor emotional experiences. Impairment of emotional memory retrieval could be associated to early deficit in interactions between a child and his/her affective environment. Our results for adolescents and young adults underline the importance of both positive and negative emotional experiences and the way they are integrated in autobiographical narratives during childhood development.

The positive correlation observed between the number of general responses and illness duration shows that this difficulty in experiencing and integrating emotional events is reinforced as the eating disorder becomes chronic. One can hypothesize that chronic patients would restrict the range of their behaviors and would systematically use the same adaptive processes that lead to a decrease of their ability to integrate new experiences. Similar observations have been made for internalized anger, which has been shown as positively correlated with the number and length of hospitalization events in anorexic adolescents [70]. As observed in depression, memory overgeneralization scores are related to the effects of previous illness experiences [54,71]. Our results suggest that the importance of memory overgeneralization deficits could stem from the repetition of negative experiences or from avoidance of emotional contexts. The repetition of unpleasant experiences or avoidance of pleasant ones leads anorexic patients to

aggravate their autobiographical deficit. Moreover, it has been shown in bulimic patients that emotional information processing evolves with age: older women are characterized by negative bias toward negatively valenced emotional material, while in younger women, more severe eating disorders are characterized by greater avoidance of both positive and negative emotion cues [57].

Surprisingly, autobiographical memories were not correlated with alexithymia or depression scores. Nevertheless, on one hand, scores on alexithymia scales are already largely out of the normal range, independent of the illness duration, and could cause a saturation effect, which removes possible correlations. On the other hand, the chronic character of anorexia nervosa reinforces the avoidance of emotional situations and could protect against depressive affect.

In that way, it will be important to observe in future studies how autobiographical memory deficit evolves after remission in order to verify whether emotion regulation improvement is the main dimension of clinical improvement in anorexic patients. Altogether, our results underline the importance of emotional process dysregulation in anorexia nervosa and, particularly, the need for therapeutic intervention both to minimize negative situation avoidance and to reinforce the hedonic features of emotional experiences. The need for early intervention to avoid a chronic installation of these emotional deficits and a more global impairment on identity construction is also suggested.

Acknowledgments

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