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Cognitive and physiological dissociations in response to emotional pictures in patients with anorexia

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ABSTRACT

Recent studies suggest that patients with anorexia may express dissociated cognitive and physiological reactivities to emotional stimuli. The present research aimed to compare subjective and autonomic responses to pleasant, unpleasant and neutral scenes during a categorization task and an activation rating task in anorexic (AN), alexithymic (AL), depressed (DEP) and control participants (CONT). The participants first categorized pictures according to their emotional valence, followed by a rating of their activation level, concomitant with the recording of skin conductance responses (SCRs). Main findings showed that the AN patients presented major difficulty in categorizing pictures, particularly neutral ones. Contrary to the AL participants, this difficulty did not induce significant increases of SCR amplitude in the AN patients. In the second task, the AN patients rated the intensity of activation of unpleasant pictures higher than the AL participants and that of pleasant ones higher than the AL and CONT participants. In addition, no significant linear correlation was observed between the intensity of activation ratings and SCR amplitude in the AN, AL or DEP participants contrarily to what was observed for control participants. This lack of relation suggests a non-specific disconnection between physiological and cognitive self-reported responses to emotional stimuli. Our results highlight a specific form of emotional processing in the AN patients distinct from that observed in alexithymia or depression and characterized by a dissociation between cognitive and physiological responses. This kind of disconnection could be associated with emotional regulation processes and may benefit the AN patients by lowering the psychological stress response.

Introduction

Following the hypothesis of Taylor et al. [1], some studies have hypothesized that a deficit in emotional processing or emotional regulation could be a main characteristic of patients suffering from eating disorders (ED) [2–4]. These ideas were initially supported by the classical observations that individuals with an ED frequently exhibit high levels of alexithymia. Alexithymia, conceptualized as a deficit in the cognitive–experiential component of the emotion response systems (subjective awareness and verbal reporting of feelings) [2], refers to an emotional profile identified by different characteristics: difficulties in discriminating between emotional states and bodily sensations, trouble identifying and expressing feelings, a deficit of imagination and fantasy life, and an externally-oriented cognitive style [5,2].

Indeed, patients suffering from anorexia (AN) are thought to commonly exhibit alexithymia with percentages in different studies ranging from 56% to 77% [1,2,6].

Since these first observations were made, experimental studies of social–cognitive or affective processing in patients with anorexia have produced the identification of different emotional deficits, such as an impairment in prosodic emotional recognition for both negative and positive voices [7,8], a deficit in emotional facial recognition [8,9], a difficulty in the integration of both negative and positive emotional experiences in autobiographical memory [10,11], an increased fear response when confronted with stimuli containing anger [12], and difficulties with emotional recognition of social-affective stimuli [13]. The recent literature review by Oldershaw et al. [4] that assesses the emotion processes in patients with anorexia confirms that their socio-emotional functioning is impaired. Oldershaw et al. support that deficits are evident in patients with anorexia when the patients

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are acquiring social-affective values and responses (indicated by heightened sensitivity and bias towards or avoidance of 'threatening' disorder specific or emotional stimuli) and when they are recognizing and responding to social-affective stimuli.

Moreover, poor recognition of emotions in others (overall facial emotion recognition) and in themselves is also evident and is indicated by the tendency to provide vague or over generalized answers both in everyday conversations and in high emotional situations [4]. These deficits have been understood to be a deficit of emotional awareness [14,15] characterized by an inability to identify and describe their own emotions, as well as an impairment in mentalizing others' emotional experiences. These characteristics have been observed both in anorexia nervosa and in bulimia [16–19]. Following the hypothesis developed by Bruch [20,21], this poor interoceptive awareness could potentially predict eating disorders in adolescent girls [22].

Nevertheless, such a deficit cannot be explained only by a deficit at the physiological or somatic level, but rather this deficit might be explained by a disconnection between the cognitive activities and the somatic responses. A study by Zonneville-Bender et al. [23] confirmed this possible disconnection between the physiological and cognitive self-reported responses to emotional stimuli both in patients with anorexia and in alexithymic participants. In patients with anorexia, Pierrehumbert et al. [24] observed a higher level of emotional physiological activation, whereas Zonnevylle-Bender et al. [23] reported a discordance between self-reported emotional and neurophysiological arousal as measured by heart rate (HR) and cortisol levels during the psychosocial stress.

The present research proposes to assess whether patients with anorexia may experience dissociated cognitive and physiological reactivities to an emotional stimuli. Such a disconnection could be a specific signature of these patients' emotional disorders.

Previous studies have already examined this type of relationship between the emotional awareness or the cognitive activities related to the emotional identification and the physiological responses to emotion-inducing stimuli in individuals with high scores of alexithymia. As pointed out by Roedema and Simons [25], most pathophysiological studies on alexithymia have focused on the hypothesis of an enhanced sympathetic arousal in the high alexithymic participants compared to the low alexithymic participants. Heterogeneous results have been observed with respect to the physiological arousal under different stressful experimental conditions [26].

The highly alexithymic subjects depict an increased sympathetic arousal, but a lowered correlation between subjective ratings and physiological stress responses [27–29]. The alexithymic individuals were believed to behave like repressors after exposure to stress.

Other studies using various load conditions reported opposite effects with an autonomic hypoarousal of the alexithymic subjects compared to the low alexithymic participants [25,30]. Stone and Nielsen [31] observed that psychophysiological response patterns of the high alexithymic subjects did not differ from the low alexithymics during the presentation of aversive movies. However, the subjective statements following the stress induction were not correlated to the emotional load of the stimulus in the high alexithymic subjects.

As mentioned by Franz et al. [26], all of these results support the "decoupling" of physiological reactions and emotional self-awareness in the alexithymic participants, but they are contradictory with respect to the direction of the autonomic response.

In the present study, we hypothesize that patients with anorexia exhibit a disconnection between the physiological responses and the cognitive activities associated with the emotion. We propose to verify whether the emotional deficits observed in the AN or AL participants are similar. As the AN participants usually have a high level of depression, we included another group of participants with depressive symptoms to control for the effect of mood disorders on emotional processes. We also hypothesize that this disconnection in the patients with anorexia is different from the emotional responses of the depressed, alexithymic and control participants.

We used skin conductance response (SCR) as a relevant indicator of the autonomic stress reactivity [32], in particular to measure the sympathetic nervous system activity [33]. Autonomic indices are relevant markers which have been classically used to evaluate the somatic impact of emotional processing. The study compared skin conductance response (SCR) and subjective variables (valence, arousal ratings) assessed in an affective picture paradigm in participants with anorexia (AN), alexithymia (AL), depression (DEP) and in control participants (CONT).

Methods

Participants

Four groups of participants were studied: 1) a group of 16 patients suffering from anorexia with a restrictive type subtype (AN), 2) a group of 18 alexithymic participants (AL), 3) a group of 16 participants with depression (DEP) (with a moderate depression score corresponding to a Beck Depression Inventory score >7) and 4) a group of 20 control participants (CONT).

The AN patients group was comprised of inpatients hospitalized for an eating disorder. All of the participants in the AN patients group were diagnosed with AN as outlined in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders [34] (DSM-IV-R), with a restrictive type (without any bulimic episodes). The patients were between the ages of 17 and 24 years and had experienced at least six months of illness. The patients with anorexia each had a body mass index (BMI) less than 16 and all exhibited a restrictive form of the illness.

All participants gave their informed consent to participate in the study after a thorough explanation of the study procedures. The protocol was approved by the local medical committee. All patients were assessed during their first week of hospitalization in the psychiatric department of St. Vincent's Hospital in Lille (France).

The control participants were matched with the patients with anorexia according to age, sex, and education level. The control group was composed of young volunteer women recruited from the University of Lille (Departments of Biology and Psychology). After giving their consent, the individuals were contacted according to their scores in both scales to form the study groups. Among a broad sample of participants ($N=400$), the women exhibiting a high level of alexithymia (TAS-20 score >56 according to the French cut-off, [35]) were selected to constitute a group with a high level of alexithymia (group AL). Similarly, the individuals with a moderate or high score for depression on the BDI (score >7) were chosen to constitute a group of depressed patients (group DEP). Finally, a group of women characterized by a low score for alexithymia and a low score for depression constituted the control group (group CONT).

Participants who were excluded were those with neurological disorders, comorbid post-traumatic stress disorders and other anxiety disorders, intellectual deficits and a recent history of drug or alcohol abuse. In addition, control participants with BMI scores less than 18 or greater than 25, with EDI scores >63 or with a history of eating disorders were also excluded from the AL, DEP and CONT groups.

Clinical assessment

We first measured the body mass index of the participants, their level of depression with the 13-item Beck Depression Inventory [36], the presence of eating disorders with the Eating Disorders Inventory (EDI 2) [37], their level of alexithymia with the Toronto Alexithymia Scale (TAS 20) [38] and their level of anxiety with the State and Trait Anxiety Inventory of Spielberger (STAI) [39].