

Cognitive-Affective Status in Anorexia Nervosa: Self-image and Absence of Positive Emotions

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Abstract

The relationships between eating disorder patterns (Eating Disorders Examination Questionnaire; EDE-Q), alexithymia (Toronto Alexithymia Scale; TAS) and cognitive-affective (Positive Affect Negative Affect Schedule; PANAS) status in forty-nine patients presenting anorexia (AN) in an age- and education-matched comparison with thirty-four healthy controls were investigated. AN patients expressed higher levels of restraint, eating concern, shape concern, weight concern and a higher global score on the Eating Disorders Examination Questionnaire. These responses were linked to higher scores on Emotional identifying, Emotional describing, Emotional orientation and Total scoring on the Toronto Alexithymia Scale. AN patients expressed also less positive affect (PA) and more negative affect (NA) than the healthy matched controls. Linear regression analysis indicated that three factors predicted the AN condition, namely Shape concern ($\beta = 0.689$) and Weight concern ($\beta = 0.570$) whereas PA was counter-predictive ($\beta = -0.291$), whereas for the Control condition, only PA was predictive ($\beta = 0.350$). The present findings are discussed from a perspective of documented regional brain dysfunctions underlying cognitive and emotional domains that have been obtained from neuro-imaging studies of anorexia.

Keywords: Anorexia; Eating disorder; Alexithymia; Affect healthy controls patients

Introduction

The anorexia nervosa (AN) condition presents a serious and potentially life-threatening eating disorder (ED) that is characterized by episodes of self-starvation and excessive weight loss that may be accompanied by excessive exercise [1]. The trans-diagnostic model of EDs is a conceptualisation of factors maintaining ED's across different diagnoses (Anorexia Nervosa, Bulimia Nervosa, EDNOS etc.). The model proposes that central to these disorders is a dysfunctional system of self-evaluation of self-worth, where self-worth is determined from perceived shape and weight and also by what extent individuals deem themselves to be in control of their shape and weight. This need for control and a specific body shape and weight is in its turn that which motivates dietary restraint and the consequent operationalization of this into various behavioural strategies and dietary rules that can either be successful (resulting in weight loss) or fail in implementation (subjective or objective binge eating episodes for example, often follow from failure to abide by dietary rules) [2,3]. Support for this model showing the centrality of over-evaluation of weight and shape and that this cognitive mind-set in its turn influences Eating restraint [4]. Studies have also shown that low self-esteem is a general influence on over-evaluation of weight and shape [5]. Since low self-esteem in its turn has been shown to be associated with higher negative affect as measured with Positive Affect and Negative Affect Schedule [6], it would therefore seem conceivable that individuals suffering from ED psychopathology experience less positive and more negative affect, as a consequence of low self-esteem.

The incidence of alexithymia in AN is about 77% with accompanying emotional problems [7], compared to a 13% incidence in the general population [8]. Clinical evidence implies that AN patients present major problems with attachment anxiety and negative affect [9,10]. The notion of AN as an anxiety-related disorder seems warranted in view of the evidence implicating anxiety, stress, fear, and avoidance learning factors in the persistence of abnormal eating habits [11,12]. It has been

observed that AN patients showed significantly greater implicit positive affect toward pleasant images and significantly greater implicit negative affect toward unpleasant, high-calorie food and overweight body type images [13]. Depressiveness among these patients was found to exert much influence too in alexithymia [7], although it did not account for all the cognitive-affective disturbances in the disorder. There appears to be a strong relationship between alexithymia and Intolerance of Uncertainty in AN patients [14]. Regional brain changes were shown to bear some relationship to alexithymia in AN; for example [15] obtained fluctuations in subcallosal cingulate connectivity that correlated with the degree of alexithymia.

The purpose of the present study was to ascertain the relationships between eating disorder patterns, alexithymia and cognitive-affective status in patients presenting AN in an age- and education-matched comparison with healthy controls.

Method and Materials

Participants

Forty-nine female patients (age range: 24 to 42 years) presenting eating disorders at diagnosis, but here limited to those presenting AN, with a history of unsuccessful treatment interventions and referred from the Department of General Psychiatry, Sahlgrenska University Hospital

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(Gothenburg, Sweden) participated in the study. All the patients were ethnic Scandinavians from higher socioeconomic groups and well-educated. They had all undergone further education at university level, following high-school graduation, for at least three years. They originated from an affluent-level economic status and upper-middle social-family backgrounds. They had all been afflicted with the AN symptoms for over five years at the time of arrival at the Anorexia & Bulimia Clinic for Adults (Sahlgrenska University Hospital), and described themselves as “well-behaved girls”. The thirty-four healthy volunteer participants (i.e. control subjects) were a group of age-matched and education-level-matched female subjects.

The ethics protocol of the University Hospital Sahlgrenska was applied and maintained. The regional ethical review board in Gothenburg approved of the study design. All the patients who were contacted agreed to participate (N = 49). Upon arrival at the clinic, each patient described her type of eating disorder and completed the Eating Disorder Inventory-2 to obtain an estimation of eating disorder and each was then given their diagnosis by the presiding staff. Thereafter, each patient was allowed to complete the questionnaire. Specifically, each patient was met on arrival at the clinic by the respective professional workers, i.e. nurse, psychologist, psychiatrist, and after a preliminary discussion was asked whether or not she would be willing to complete a questionnaire in order for the psychiatrist to obtain further insights into the AN condition. Following this, each patient received instructions and was assigned 30-45 min to respond to the items in the instrument.

Instruments

Background health information: Background variables, such as age, years of education, smoking and drinking habits, pain, use of mood-enhancing drugs and analgesics, and frequency and duration of exercise, etc., were completed according to the description and procedure outlined in [16].

Positive affect negative affect schedule: This is one of the most commonly applied instruments for estimating high arousal affect and was developed on the premise that PA and NA represent two orthogonal independent dimensions: high PA versus low PA and high NA versus low NA [17]. The instrument instructs participants to rate to what extent they have experienced generally the 20 different feelings or emotions (10 PA and 10 NA) during the last week, using a 5-point Likert scale (1 = very slightly, 5 = extremely). The 10-item PA scale includes adjectives such as “strong, proud, and interested”; the 10-item NA scale includes adjectives such as “afraid, ashamed, and nervous”. In their study, [18] reported a Cronbach's alpha of .88 for the PA scale and .83 for the NA scale. In the present study, the PA and NA scales showed similar internal reliability (.87 for PA and .79 for NA).

Eating Disorders Examination-Questionnaire (EDE-Q): The EDE-Q was originally derived from the Eating disorder examination [19], which is a semi-structured interview method. EDE has long been considered the “gold-standard” for diagnosis and assessment of Eating disorders [20]. EDE-Q was designed to provide a similarly thorough assessment of ED symptoms and behaviours. Studies of the validity of EDE-Q has shown high levels of concordance between EDE and EDE-Q regarding measurement of attitudes central to ED's [21,22]. EDE-Q is at present one, if not the most widely used self-report instrument for measuring ED's [23,24]. It is composed of 36 items measuring behaviours and experiences relevant for ED's that has taken place during the last 28 days. Four subscales can be calculated: 1) Restraint, 2) Eating concern, 3) Weight concern and 4) Shape concern. Items making up the subscales are answered in a 6-point Likert format. A global score

measuring overall severity of the disorder may also be calculated by adding mean scores from the four subscales. Version 6.0 procedures for calculating results were used. Cronbach's alpha values were as follows: Restraint .90, Eating concern .87, Weight concern .87, Shape concern .96, Global .79.

Toronto alexithymia scale: The Toronto Alexithymia Scale [25,26] offers a self-report instrument that estimates deficiencies in understanding, processing, or describing emotions. The version applied here presents a 20-item (statements) questionnaire on a five-point likert scale. An example of a statement would be: e.g. “When asked which emotion I'm feeling, I frequently don't know the answer”, or “I am unsure of which words to use when describing my feelings”. The cut-off point for severe alexithymia was 61 points and above. This instrument has been shown to possess a high level of reliability and validity. The TAS-20 has three subscales: (i) Difficulty Describing Feelings subscale is used to measure difficulty describing emotions, (ii) Difficulty Identifying Feeling subscale is used to measure difficulty identifying emotions, and (iii) Externally-Oriented Thinking subscale is used to measure the tendency of individuals to focus their attention externally. The total TAS-20 score shows generally good internal consistency (Cronbach's alpha = .81) and test-retest reliability (.77, $p < .01$). In the present study, Cronbach's alpha was .86; and for Difficulty Describing Feelings .84, Difficulty Identifying Feeling .85, and Externally-Oriented Thinking .69.

Results

Pillai's MANOVA (2 x 4) was applied with AN-patient/Healthy control and Affective personality as independent variables and with EDE-Q-Restraint, -Eating concerns, -Shape concerns, -Weight concerns, -Global score, TAS-20-Total score, -Identifying emotions, -Difficulty describing emotions, -Externally-oriented thoughts, Alexithymia, PANAS-PA and PANAS-NA as dependent variables indicated a significant main effect for AN-patient/Healthy control ($F(10, 67) = 2.57, p < 0.02, \eta^2 = 0.269, \text{observed power} = 0.918$). One-way ANOVA with AN-patient/Healthy control as independent variable indicated significant effects upon EDE-Q-Restraint, -Eating concerns, -Shape concerns, -Weight concerns, -Global score, TAS-20-Total score, -Identifying emotions, -Difficulty describing emotions, -Externally-oriented thoughts, Alexithymia, PANAS-PA and PANAS-NA (as dependent variables). Table 1 presents the means and standard deviations (as well as ANOVA F-values) for participants' responses (AN patients versus Healthy controls) with regard to the dependent variables.

Regression Analysis

Separate regression analyses were performed on the AN patients and healthy controls in order to ascertain which of the above variables were predictive for either the anorexic or the healthy condition, respectively. The analysis indicated that AN patient condition could be predicted ($F(9, 83) = 9.14, p < 0.001, \text{adjusted } R^2 = 0.625$). The significant predictors were shape concern and weight concern whereas positive affect was counter-predictive (Table 2). Restraint, eating concern, global score, TAS total, TAS-Emotional Identifying, TAS-Emotional Describing, TAS-External Orientation, and negative affect were nonsignificant. The analysis indicated also that the healthy control condition could be predicted ($F(9, 50) = 9.70, p < 0.001, \text{adjusted } R^2 = 0.618$). The single significant predictor was positive affect (Table 3). Restraint, eating concern, shape concern, weight concern, global score, TAS total, TAS-Emotional Identifying, TAS-Emotional Describing, TAS-External Orientation, and negative affect were non-significant.

Factor	ANOVA	AN patients	Controls
EDE-Q-Restraint	F(1, 104) = 53.07*	3.67 ± 1.72	1.29 ± 1.46
EDE-Q-Eating concern	F(1, 100) = 96.31*	3.31 ± 1.55	0.59 ± 0.98
EDE-Q-Shape concern	F(1, 100) = 103.49*	4.78 ± 1.29	1.82 ± 1.61
EDE-Q-Weight concern	F(1, 97) = 55.94*	4.02 ± 1.58	1.64 ± 1.48
EDE-Q-Global score	F(1, 95) = 87.43*	3.92 ± 1.37	1.34 ± 1.26
TAS-Total score	F(1, 99) = 70.92*	57.68 ± 13.51	36.90 ± 9.53
TAS-Emotional Identifying ¹	F(1, 95) = 68.80*	23.17 ± 6.13	13.07 ± 4.52
TAS-Emotional Describing ²	F(1, 95) = 56.48*	15.71 ± 4.45	9.48 ± 4.17
TAS-External Orientation ³	F(1, 95) = 13.57*	18.76 ± 5.88	14.53 ± 3.86
Alexithymia (yes/no)	F(1, 99) = 50.78*	1.12 ± 0.80	0.15 ± 0.36
Positive affect	F(1, 94) = 42.45*	25.01 ± 8.30	35.98 ± 7.56
Negative affect	F(1, 93) = 63.28*	32.72 ± 8.53	19.62 ± 5.28

Values present Means ± SD; *p < 0.001.

Table 1: Self-reported EDE-Q-Restraint, -Eating concern, -Shape concern, -Weight concern, -Global score, TAS-Total score. – Problems identifying emotions¹, Problems describing emotions², - Externally-oriented thinking³, Alexithymia, positive and negative affect.

Predictor variable	Standardized β	
Shape concern	0.689	P = 0.001
Weight concern	0.570	P = 0.009
Positive affect	-0.291	P = 0.002

Table 2: Standardized weights from linear regression analysis with AN condition as dependent variable and EDE-Q-Restraint, -Eating concern, -Shape concern, -Weight concern, -Global score, TAS-Total score. – Problems identifying emotions, Problems describing emotions, - Externally-oriented thinking, Alexithymia, positive and negative affect as independent variables.

Predictor variable	Standardized β	
Positive affect	0.350	P = 0.015

Table 3: Standardized weights from linear regression analysis with the healthy control condition as dependent variable and EDE-Q-Restraint, -Eating concern, -Shape concern, -Weight concern, -Global score, TAS-Total score. – Problems identifying emotions, Problems describing emotions, - Externally-oriented thinking, Alexithymia, positive and negative affect as independent variables.

Discussion

Several important aspects associated with eating disorders were presented by the AN patients: they expressed higher levels of restraint, eating concern, shape concern, weight concern and a higher global score on the Eating Disorders Examination Questionnaire (Table 1). These responses were accompanied by higher scores on Emotional identifying, Emotional describing, Emotional orientation and Total scoring on the Toronto Alexithymia Scale, which was confirmed by significantly more affirmative responses to the question regarding alexithymia. AN patients expressed also less PA and more NA than the healthy matched controls. This pattern of results confirms and extends the findings obtained different sets of AN patients [27,28]. In order to examine which self-reported attributes may have a predictive relationship to the AN diagnosis a linear regression analysis was performed: three factors predicted the AN condition, namely Shape concern ($\beta = 0.689$) and Weight concern ($\beta = 0.570$) whereas PA was counter-predictive ($\beta = -0.291$). For the Control condition, only PA was predictive ($\beta = 0.350$). In another study (Garcia et al., under preparation) comparing AN patients with healthy controls (age/education-matched) the former expressed higher scores on past negative and present fatalistic dimensions, conscientiousness, extraversion, agreeableness and neuroticism. Healthy controls scored higher on all other time perspective dimensions and temporal life satisfaction. Hierarchical

multiple regressions indicated that AN patients' temporal life satisfaction was predicted by personality although the time perspective dimensions contributed to this prediction to a great extent whereby the unique predictors were past positive and present hedonistic, implying that AN patients' notions of past and present may modulate well-being above and beyond their personal attributes. In a study on well-being among ED patients it was observed that they expressed less PA but not significantly more NA [29], whereas ED-related thoughts seem to be triggered by negative emotions [30,31]. Further, the incidence and negative role of affect and psychological distress in maintaining the disorder in AN patients has been observed [32-34]. Both clinical depression [35] and anxiety [36] are associated markedly with NA, as shown in preclinical studies [37,38]. The markedly higher levels on all five measures of alexithymia (TAS) confirm previous observations [39], and are indicative of negative affect complications [40].

The trans-diagnostic model of EDs, conceptualizing factors considered to maintain the disorders over different diagnoses, proposes that integral to these disorders exists a dysfunctional system pertaining to evaluation of self-worth, wherein self-worth is determined from perceived shape and weight and also by what extent individuals deem themselves to be in control of their shape and weight. The observation that body and weight concerns predicted AN diagnosis (above) implies that cognitive-emotions or selective attentional processes may either contribute to or bolster the disorder. Certainly, any need for control and a specific body shape and weight may in turn motivate dietary restraint and an operationalization into behavioural strategies and dietary rules that can either be successful (resulting in weight loss) or fail in implementation (subjective or objective binge eating episodes) arising, e.g. from failure to abide by dietary rules [41]. The notion of over-evaluation of weight and shape may influence eating restraint compulsivity [42]. It has been observed also that low self-esteem is a general influence on over-evaluation of weight and shape low self-esteem is linked to low PA and high NA [38] and in its turn may be contributory also. AN patients display impairments in several aspects of social cognition [43,44], with specific regard to social signals reflecting emotional states of those in their proximity [45,46] and an exaggerated tendency to observe body rather than eyes [47]. It was found recently that while AN patients reliably orient to different temporal intervals they showed deficits orienting to cue type, or altered selective attention [48]. It has been observed that patients presenting AN display widespread alterations in executive functioning and associated tissue damage [49-52]. For example, in a functional magnetic resonance imaging (fMRI) study, reduced activation in the frontostriatal network of AN patients when performing behavioural shifts, independent of the cognitive shift requirement [53]. In an examination of the neural correlates of cognitive flexibility and learning in AN patients, [54] compared 32 adult female AN patients with 32 age-matched female healthy controls undergoing fMRI during the performance of the Wisconsin Card Sorting Task using event-related analysis during the cognitive shift from maintenance of rule-sets and learning. AN patients displayed higher blood-oxygenated-level dependent responses during shifting but lower responses when maintaining rule-sets in comparison with the healthy controls. Posterior cingulate cortex activity was elevated in AN patients but reduced in the healthy controls whereas an opposite pattern was observed in the right precuneus and the caudate nucleus was lower in AN patients. Taken together, it was concluded that the results implied how perseverative tendencies may underlie multiple high-order processes that together contribute to AN.

Limitations

From a 'trait or state' perspective the current study's sample may

be deemed as lacking in generalizability. The large effects of positive and negative affectivity/shape concern and weight concern raises questions regarding state dependent differences between the two groups participating in this study. It is feasible that the present results might to some extent be a product of differing contexts; the participant's experiences of their inner emotional life might have been influenced by the specifics of their situation [55]. The patient sample consisted mostly of newly received patients just having started treatment, but also of patients that already had received psychotherapy for some time. The new patients were asked to participate after having received general information regarding eating disorders, which most certainly meant that many of them were in distress regarding their psychopathology and its effect on their lives. This distressed state might have led to the participants experiencing and subsequently reporting greater levels of negative feelings. Information received regarding the nature of ED's might also have led to greater awareness of their own preoccupation with body shape and weight. A somewhat similar process might be relevant in the case of the patients who already had started treatment. A psychodynamic psychotherapeutic process (which is the main therapeutic modality these patients were receiving) is to be expected to raise awareness of ones emotional states [56] which might make negative emotions more salient, and arguably also awareness of ones eating disordered behaviours which is the major object of change and discussion in treatment. The control group in contrast was recruited at an evening lecture at a part time course in sexology held at Gothenburg University. The lecture was about an unrelated subject and the participants participated in the study during a break. In this context one could expect the participants from the control group to be both less distressed and less self-aware regarding their self-evaluation of shape and weight.

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