

## Depression in anorexia nervosa

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**SYNOPSIS** In three collaborating institutions 105 hospitalized female anorexia nervosa patients were assessed for depressive symptomatology periodically during treatment. As a whole, patients were mildly to moderately depressed, being as depressed as anxious neurotics and less depressed than depressed neurotics. The more depressed patients showed a variety of characteristics, many of which have previously been shown to be indicators of poor prognosis. Over the course of treatment patients became less depressed. Weight gain was correlated with a decrease in depression.

### INTRODUCTION

Mood changes, particularly depression, frequently occur in anorexia nervosa patients. It has been said that anorexia nervosa, especially in older patients, is essentially a form of depressive illness (Kay, 1953). Some investigators have suggested that there is a relationship between anorexia nervosa and affective disorder and that significant depression is present not only in patients during the acute anorexic illness but also in the pre-morbid and post-morbid states when weight may be quite normal (Cantwell *et al.* 1977; Hsu *et al.* 1979; Kay & Leigh, 1954; Morgan & Russell, 1975; Dally, 1969; Stonehill & Crisp, 1977; Theander, 1970; Halmi *et al.* 1973; Warren, 1968). The proportion of patients showing signs of depression during the acute illness varies from about 35% to 85% in various studies (Ben-Tovim *et al.* 1979; Hsu *et al.* 1979; Kay & Leigh, 1954; Morgan & Russell, 1975; Theander, 1970; Warren, 1968). Folstein (1977) administered an analogue depression scale to 38 anorexia nervosa patients and found that they showed a significantly greater degree of depression than normal controls, but less depression than patients with primary depression. Stonehill & Crisp (1977), using the Middlesex Hospital Questionnaire (MHQ), reported that patients

with anorexia nervosa were significantly less depressed than a population of depressed females of comparable age, but significantly more depressed than healthy female university students.

There is compelling evidence that the noradrenergic neurotransmitter system is involved in the control of feeding behaviour, as shown primarily in animal studies (Margules *et al.* 1972; Ahlskag & Hoebel, 1973) and in primary depression (Schildkraut *et al.* 1973; Maas *et al.* 1972). A recent study by three of our investigators has shown that urinary 3-methoxy-4-hydroxyphenylglycol (MHPG) was significantly lower in acutely ill anorexic patients than in female controls (Halmi *et al.* 1978). An increase in urinary MHPG was significantly correlated with a decrease in depression ratings after weight gain. However, the change in urinary MHPG was not significantly associated with the change in weight or activity level in individual patients.

Depression also occurs frequently in the families of anorexics (Cantwell *et al.* 1977; Crisp *et al.* 1974; Morgan & Russell, 1975; Theander, 1970; Warren, 1968). However, there is no conclusive information on a possible familial relationship between anorexia nervosa and depression. Cantwell *et al.* (1977) have reported the highest incidence of depression in families of anorexics. In a follow-up study of 26 anorexic patients they diagnosed 33% of the parents (58% mothers and 8% fathers) as having affective disorders. Theander (1970), however, in his study of 94 anorexics found no

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evidence for a familial relationship between anorexia nervosa and affective disorder.

A comparison of studies reporting depression in anorexics is difficult because of differences in methods of assessment of depressive symptomatology and in diagnostic criteria. Often the method of assessment is not clearly stated and it seldom involves systematic measurement.

We examined 105 female hospitalized anorexia nervosa patients for depressive symptomatology by means of a variety of rating instruments at various times during a 42-day assessment and treatment programme. In order to define further the subgroup of patients with depressive symptoms we looked for correlations between depression and a variety of pre-treatment measures. The change in depression was examined over treatment time.

## METHODS

In a controlled, National Institute of Mental Health sponsored treatment study involving three participating hospitals (University of Iowa, University of Minnesota, Illinois State Psychiatric Institute) 105 female anorexia nervosa patients meeting the rigid research diagnostic criteria of Feighner *et al.* (1972) were entered in a pre-treatment period of 7 days in hospital, following which they were randomly assigned to treatment with cyproheptadine or placebo (Goldberg *et al.* 1979), and behaviour modification or its absence (Eckert *et al.* 1979), and observed in hospital for 35 days. The behaviour modification programme was essentially an operant conditioning programme with negative reinforcement of isolation and positive reinforcements of social and physical activities contingent on weight gain. All patients received individual psychotherapy and a ward milieu therapy in addition to the study treatments. Patients were evaluated at pre-treatment and periodically during treatment on a variety of social and psychiatric history variables, and on several other measures, including ward behaviour, psychic distress, body image, food preferences, and anorexic attitudes.

Several rating scales were used to assess depressive symptomatology. The Raskin Mood Scale (Schulterbrandt *et al.* 1974), a self-rating scale, was also used as an observer scale and rated by two nurses. On the basis of prior factor

analyses, depressed mood is one of 10 factors on which the mood scale is scored. The Hopkins Symptom Checklist (HSCL) was self-rated by the patient and rated by 2 nurses (Derogatis *et al.* 1974). Depression is one of 6 factors on which the 61-item checklist is scored. On the Minnesota Multiphasic Personality Inventory (MMPI) depression is measured as one of the 9 clinical scales.

Other measures were used to assess the patients' personality characteristics, attitudes and symptoms at pre-treatment:

(1) A structured psychiatric and social history form containing 290 items seeking information from the patient and her family concerning events and attitudes preceding and since the onset of illness, plus a medical and developmental history; this is obtained following admission by a social worker.

(2) The Slade Anorexic Behaviour Scale (Slade, 1973), which requires 2 nurses to observe the presence or absence of anorexic behaviour such as exercising, delayed meal times, concealing food.

(3) The Goldberg Anorexic Attitude Scale (Goldberg *et al.* 1980) consisting of 63 attitude statements, answered by the patient, representing 8 attitude categories typical of anorexia nervosa: (a) denial of illness, (b) loss of appetite, (c) interpersonal control, (d) thin body ideal, (e) hypothermia, (f) hyperactivity, (g) psychosexual immaturity, and (h) independence seeking.

(4) A body size estimation task (Slade & Russell, 1973) called the body perception test in this study, administered by a research nurse, which involves a visual estimation of different

Table 1. *Pre-treatment depression ratings for anorexia nervosa patients*

Rating scale	Range	Mean	S.D.
Raskin Mood Scale			
Self-rated	1 = absent 4 = severe	2.22	0.80
Nurse-rated	1 = absent 4 = severe	1.92	0.40
Hopkins Symptom Checklist			
Self-rated	1 = absent 4 = severe	2.14	0.67
Nurse-rated	1 = absent 4 = severe	1.75	0.32
MMPI	17-49	30.88	7.29

body parts and areas that can be compared with the actual sizes; both measures give a body image perception index.

(5) A self-description questionnaire containing bipolar adjective descriptions presented in a semantic differential form; this form was devised for this study and is answered by the patient.

(6) A situational discomfort scale containing items which describe situations in varying proximity to the eating process; this scale was devised for this study and is rated by the patient.

## RESULTS

### Severity of depression at pre-treatment

Table 1 shows the pre-treatment means and standard deviations of the measures of depression obtained on the anorexic patients. On both the Raskin Mood Scale and the Hopkins Symptom Checklist the nurses' ratings reflect their seeing fewer depressive features in the patients than the patients see in themselves. Although the Raskin Mood Scale has been used extensively as both a self-rated and a nurse-rated instrument, the Hopkins Symptom Checklist has been standardized only as a self-report scale and not as a nurse's rating instrument. The validity of the Hopkins Symptom Checklist self-rated depres-

sion factor has been established by showing neurotic patient groups to differ from controls (Derogatis *et al.* 1974). Depressed neurotics have a mean score of 2.62, anxious neurotics 2.04, and normal controls 1.14. Our anorexics as a group are thus somewhat more depressed than the anxious neurotics and less depressed than depressed neurotics using this scale. The MMPI rating of depression with a raw score of 30.88 indicates mild to moderate depression (just over 2 s.d. above the general population mean).

Hence, all these rating instruments agree reasonably well that, as a group, this population of anorexics is mildly to moderately depressed and, compared with other normative groups (anxious neurotics), may be said to manifest a clinically significant level of depression.

### Correlates of severity of depression

In order to define better the subgroup of anorexic patients who were depressed, correlates were obtained between a variety of pre-treatment measures and these ratings of depression. Table 2 shows the correlation of depression in our patients with frequently described patterns of eating behaviour in anorexia nervosa. It appears that the more depressed patients have more bizarre food habits: they are more selective in their appetite; they are also more bothered by

Table 2. Correlations of depression in anorexia nervosa patients ( $N = 105$ )

Characteristics associated with eating	Hopkins Symptom Check List		Raskin Mood Scale		MMPI
	Self-rated	Nurse-rated	Self-rated	Nurse-rated	
More bizarre food habits (Slade Anorexic Behaviour Scale)	—	0.38	—	0.32	—
More selective appetite (Psychiatric Rating Scale)	—	0.30	—	0.22	—
More bothered by eating food (Situational Discomfort Scale)	0.39	0.25	0.43	0.22	0.31
Greater fear of compulsive eating (Psychiatric Rating Scale)	0.21	—	0.24	—	0.29
More bothered by time to eat (Situational Discomfort Scale)	0.52	0.26	0.50	0.20	0.44
Greater aversion to sweets (Food Preference Scale)	—	—	0.23	—	0.25
Greater aversion to low calorie meats (Food Preference Scale)	0.21	—	—	—	—
Greater fear of fat (Psychiatric Rating Scale)	0.28	0.29	0.25	0.29	—
Strong appetite (Anorexic Attitude Scale)	—	—	0.29	0.20	0.21
Greater feeling that food is sickening to stomach (Anorexic Attitude Scale)	0.27	0.35	0.32	0.29	0.23
More bothered by feeling stomach being distended by food (Situational Discomfort Scale)	0.46	—	0.39	—	0.36
History of bulimia (Social History)	—	—	—	—	0.23
Greater frequency of bulimia (Social History)	—	—	—	—	0.22
More vomiting (Social History)	—	—	—	0.20	—
Less cooking during present illness (Social History)	0.22	0.24	—	0.21	—
Less cooking to unusual extent prior to illness (Social History)	—	0.21	—	0.26	—

$r = 0.193, P < 0.05; r = 0.252, P < 0.01.$

the approach of mealtime, by eating food, and by feeling their stomach distended by food. The more depressed patients also have a greater feeling that food is sickening to the stomach, showing a greater aversion to sweets and to low calorie meats. Some anorexic patients can successfully deny or ignore hunger, claiming that they have no appetite. Depressed anorexics admit to a strong appetite, and they have a greater fear of compulsive eating and of becoming fat. They tend to be bulimic, having both a history and a greater frequency of bulimia. Depressed anorexics also vomit more frequently.

The more depressed patients do less cooking before the onset of the anorexic illness and less cooking during the illness prior to hospitalization. It is noteworthy that in our study patients who do more cooking before the onset of illness gain more weight than those who do not; hence hobby cooking is a good prognostic indicator.

Overall, it appears that the more depressed anorexics may show a greater disturbance of eating behaviour and eating attitude.

Table 3 shows the correlations of depression with characteristics associated with body image. Depressed anorexics, as judged by the psychiatrist and by self-report, have more of a thin ideal, i.e. they would prefer to be thinner. They are more bothered by their self-image, perceive themselves as having a larger and less attractive

body, and are judged by the psychiatrist as having a greater fear of becoming fat. On the only objective test of body image used in this study, the Body Perception Test (Slade & Russell, 1973), they show a greater distortion of body image in the direction of overestimating actual body size. They overestimate the 5 body widths measured by the test and they also overestimate foot length. Overall, it appears that the more depressed anorexic shows a greater disturbance of body image in that they feel that their bodies are oversized.

Table 4 shows the correlations of depression in anorexics with a number of other characteristics. The first 6 items on this table illustrate that the more depressed patients are also those who are at the lower end of the weight distribution – before the current episode of weight loss, during pre-treatment, and also post-treatment. They have a greater percentage weight loss from a normal weight for their age and height, both at pre-treatment and also after treatment. However, there is no correlation between the initial level of depression and percentage weight gain: i.e. it is not shown that depressed patients tend to gain less weight, although we shall show later that *change* in depression is correlated with weight gain.

Patients who are more depressed show more denial of illness by self-report: i.e. they would be more likely to say, 'yes, I did lose some weight,

Table 3. *Correlations of depression in anorexia nervosa patients (N = 105)*

Characteristics associated with body image	Hopkins Symptom Check List		Raskin Mood Scale		MMPI
	Self-rated	Nurse-rated	Self-rated	Nurse-rated	
More thin ideal (Psychiatric Rating Scale)	0.22	0.29	—	0.27	—
More thin ideal (Anorexic Attitude Scale)	0.40	—	0.37	—	—
More bothered by self-image (Situational Discomfort Scale)	0.37	—	0.30	—	—
Greater fear of becoming fat (Psychiatric Rating Scale)	0.28	0.29	0.25	0.29	—
Perception of larger body size (Self Description Questionnaire)	0.30	—	0.39	—	0.23
Perception of having a less attractive body (Situational Discomfort Scale)	0.25	—	—	—	0.23
Greater overestimation of body depth (Body Perception Test)	—	0.32	0.23	0.31	—
Greater overestimation of chest (Body Perception Test)	—	—	0.22	—	—
Greater overestimation of waist (Body Perception Test)	—	0.26	—	0.22	—
Greater overestimation of hips (Body Perception Test)	0.25	0.28	0.27	0.27	—
Greater overestimation of face (Body Perception Test)	—	0.33	—	0.33	—
Greater overestimation of composite of 5 widths (Body Perception Test)	—	0.32	0.22	0.30	—
Greater overestimation of foot length (Body Perception Test)	—	0.26	—	0.22	—

$r = 0.193, P < 0.05; r = 0.252, P < 0.01.$

but not enough for everybody to get as worried as they did'.

Depression is one of the few characteristics in these patients that we have shown to correlate at all with purgative abuse. It appears that the more depressed anorexic also tends to abuse laxatives.

The more depressed patients tend to show marked sexual disinterest and disgust, and a decreased interest in sex since the onset of their illness. These items come from a social history obtained by the social worker and from the Goldberg Anorexic Attitude Scale (Goldberg *et al.* 1980).

**Temporal change in depression**

In order to assess change in depression over treatment time, time trends were calculated for the rating scales used. The means for these rating scales which achieved significant changes over time are given in Table 5. Generally, there is a reduction in depression over time on the various rating scales used, although the symptoms are

not completely eliminated. This could be due to the fact that the patients were only treated for 35 days. Further reduction might have occurred with a longer duration of treatment.

**Effects of cyproheptadine and behaviour modification on depression**

The effect on depression of the treatments – cyproheptadine and behaviour modification – used in this study was analysed by repeated measures analysis of variance. There was no drug effect on any of the depression ratings, but the behaviour modification programme used did show an effect on the rating of depression. Fig. 1 shows the difference in the effect on patients treated with and without behaviour modification, using the nurses' rating scale of depression on the Hopkins Symptom Checklist. Although there was a reduction of depression in both treatment groups, the extent of this reduction was greater for patients not receiving behaviour modification. This result was significant at the 0.05 level and was consistent in all three hospitals. It

Table 4. Correlations of depression in anorexia nervosa patients (N = 105)

	Hopkins Symptom Checklist		Raskin Mood Scale		MMPI
	Self-rated	Nurse-rated	Self-rated	Nurse-rated	
Greater % weight loss from norm at pre-treatment	—	—	—	—	0.25
Greater % weight loss from norm at post-treatment	—	0.19	—	0.20	0.17
Lower weight first treatment day (day 8)	—	0.33	—	0.27	—
Lower weight last treatment day (day 42)	—	0.33	—	0.28	—
Lower weight prior to this episode	—	0.28	—	0.21	—
Lower lowest weight ever	—	0.37	—	0.29	—
More denial (Anorexic Attitude Scale)	0.41	0.29	0.40	0.26	—
Purgative abuse (Slade Anorexic Behaviour Scale)	0.24	—	0.20	—	0.24
Less compatibility with fathers (Social History)	—	—	0.20	—	—
Less sexual interest (Anorexic Attitude Scale)	0.24	—	0.27	—	0.21
More feeling that sex is disgusting (Social History)	0.27	—	0.27	—	0.23
More sexual decrease since onset of illness (Social History)	0.19	—	—	—	0.28
More sexual disinterest (Social History)	0.35	—	0.28	—	—

$r = 0.193, P < 0.05; r = 0.252, P < 0.01.$

Table 5. Time trends for depression ratings (N = 105)

Rating scale	Pre-treatment		Day				F	P
	2	5	12	22	32	42		
Raskin Mood Scale (self-rated)	2.18	2.16	2.00	1.89	1.91	1.76	6.36	<0.001
Hopkins Symptom Check List (self-rated)	2.28	2.11	1.99	1.85	1.83	1.70	12.78	<0.001
MMPI	30.67	—	—	—	—	25.42	59.17	<0.001

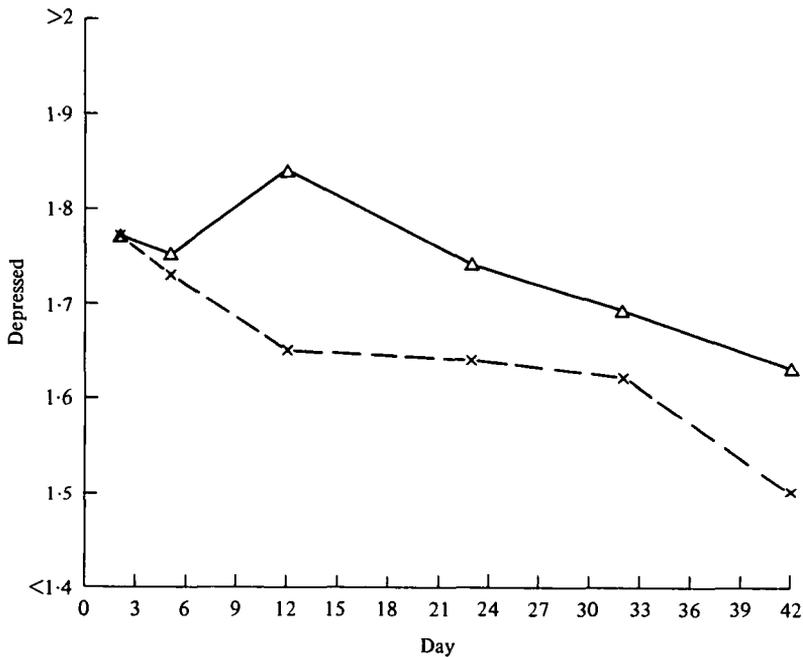


FIG. 1. Nurse's rating of depression symptoms.  $\Delta$ , behaviour modification;  $\times$ , no behaviour modification. Range for depression rating: 1 = absent, 4 = severe.

should be noted that, since the nurses' ratings could not be made blind as regards to treatment assignment, the results are partly a function of whatever biases the nurses held regarding the merits of behaviour modification. This result appears to indicate that the behaviour modification programme used had a somewhat negative effect in retarding the reduction of depression over time. However, it is well to note that the effect was only apparent on the nurses' ratings and not on any of the self-ratings. It would appear that there is insufficient consistency of this result across the various measures of depression to incriminate behaviour modification as having a deleterious effect.

#### Weight gain versus change in depression

There is evidence that starvation or weight loss is associated with depression, and we therefore wanted to see if weight change was associated with change in depression. Those who gained more weight showed the greater decrease in depression on each of the rating scales used (Table 6). This reinforces the previously discussed idea that the depression in anorexic patients is

Table 6. Correlations of weight gain in anorexic patients with decrease in depression ratings ( $N = 105$ )

Rating scale	$r$	$P$
Hopkins Symptom Checklist		
Self-rated	0.348	<0.001
Nurse-rated	0.390	<0.001
Raskin Mood Scale		
Self-rated	0.299	<0.01
Nurse-rated	0.416	<0.001
MMPI-D Scale	0.216	<0.05

closely related to their weight loss, and that weight gain may be an important determinant in combating the depression in these patients.

#### DISCUSSION

Although there was a range in the amount of depression in mood and symptoms in our 105 patients, the group as a whole was only mildly to moderately depressed and did not show as high a level of depression as a normative group of primarily depressed neurotics, although they were more depressed than a normative group of

anxious neurotics. Our data show that, if a patient is more severely depressed in mood and symptoms, she is also likely to show more disturbed eating attitudes and eating patterns (including more bulimia and more vomiting) and a more disturbed body image. It is likely that she will have achieved a lower weight and will have more denial as to the severity of her illness. She will abuse laxatives. She will show a more disturbed relationship with her father. She will also have more sexual disturbances, including a decrease in sexual interest since the onset of illness. From the data obtained we cannot say whether there is a causal relationship between the depressive symptoms and other characteristics of the anorexic syndrome. Depression does not necessarily cause anorexic symptoms; nor can we say that other anorexic symptoms cause depression.

If it is true that anorexia nervosa, especially in older patients, is essentially a form of depressive illness, our data do not directly confirm this. We did not find a direct correlation between age and depression, although some symptoms often associated with depression – like fatigue, sleep disturbance and decreased interest in sex – were associated with the later age onset group (Halmi *et al.* 1979).

Many of these characteristics which we have found to be associated with depressive symptoms have been shown to be indicators of poor prognosis, both in our study and in others. Although depressive symptomatology was not directly correlated with weight gain in our study, change in depression was, and it may be that the more depressed patients are also those who tend to be more severely and chronically ill. It would be interesting to see what effect antidepressants would have on depression in these patients and also what they would do to the associated characteristics in these patients, especially the eating and body image disturbances. Needleman & Waber (1976) administered amitriptyline to 5 anorexia nervosa patients in an open uncontrolled study and found an improvement in mood along with weight gain, plus an improvement in other anorexic symptoms.

In our study we found that depressive symptoms decreased over treatment time and, although we cannot be sure what caused the decrease in depression, we were able to show that weight gain was strongly correlated with a

decrease in depression. It may be, therefore, that any method which induces weight gain will be helpful in relieving depression in these patients. Although we found some evidence that the behaviour modification programme used may have a negative effect on depression – in that patients treated with the programme did not decrease depressive symptoms as much as those treated without it – this result lacked consistency across the various measures of depression, and hence should not be viewed as indicating that behaviour modification hinders improvement in depression.

It must be noted that in this study depression was measured in terms of symptoms and mood. Patients were not assessed to determine whether they met formal criteria for affective disorder in either the pre-morbid or morbid state. Cantwell *et al.* (1977) suggested that anorexia nervosa may be a variant of affective disorder because of the strong family history of affective disorder, the high frequency of depressive symptoms in the pre-morbid state (determined retrospectively) and the frequent diagnosis of affective disorder using Feighner's criteria (Feighner *et al.* 1972) in the anorexic patients at follow-up. Apart from their study, however, there is no good evidence to support this association. We cannot be sure, at present, of the significance of depression in the acute anorexic state. We do know that emaciation is associated with depressive symptomatology and that early morning awakening, which characterizes the anorexic population and which appears on many symptom scales of depression, is a feature of impaired nutritional status and is unrelated to affective state (Crisp & Stonehill, 1973). It is also possible that the symptoms of depression in the anorexics are a reaction, along with other psychoneurotic traits, to the situational and personality problems facing the patients in their adolescent turmoil and that the depressive symptoms are not part of a true depressive state.

In summary, it would appear from the results of this study that (a) anorexia nervosa patients manifest a clinically significant level of depression; (b) the severity of depression is associated with other characteristics which have been classically considered as signs of greater severity of illness; (c) the level of depression is reduced but not eliminated over time; (d) patients with a

greater reduction of depression gain more weight. It is a matter of interpretation whether the depression is a product of emaciation and lifts as weight is regained, or whether weight loss is produced by depression. Our data do not permit a choice between these alternatives. Perhaps a study of a standard antidepressant would shed light on the nature of the depression in anorexic patients.

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