Internalizing Psychiatric Comorbidities Among Adolescents with Anorexia Nervosa

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Abstract: Anorexia Nervosa (AN) is a multifactorial psychiatric disorder classified among eating and feeding disorders and frequently associated with psychiatric comorbidities, particularly among adolescents. The main objective of the study was evaluating the psychiatric comorbidities associated with AN, analyzing how these conditions influence each other, triggering challenges in clinical management.

The study was conducted at the Child Neuropsychiatry Unit Clinic at Vanvitelli University and involved 60 AN inpatients. Retrospective data collection was obtained through analysis of several psychodiagnostic tests. The EAT-26 (Eating Attitude Test) was administered to assess the presence of dysfunctional eating behaviors, while the BUT (Body Uneasiness Test) was used to identify potential signs of body dysmorphic disorder. The SCARED (Screen for Child Anxiety Related Disorders) and CDI (Children's Depression Inventory) were employed to investigate the presence of anxious and depressive symptoms. The WISC-IV (Wechsler Intelligence Scale for Children – Fourth Edition) was used to measure intellectual quotient and exclude the presence of intellectual disability. In addition, BMI at discharge of patients was evaluated as an outcome measure for treatment.

Results highlight a significant relationship between AN and psychiatric comorbidities, providing important insights for a deeper understanding of the psychiatric dynamics associated with AN. Pearson correlation analysis revealed a strong positive correlation between the scores of the Eating Attitude Test (EAT-26) and the Body Uneasiness Test (BUT) ($r=0.730$; $p<0.001$), suggesting that subjects with dysfunctional eating behaviors tend to exhibit high dissatisfaction with their body image. A moderate correlation between the EAT and the SCARED (Screen for Child Anxiety Related Emotional Disorders) ($r=0.505$; $p<0.001$) indicates that eating disorders are associated with elevated anxiety levels, while the EAT showed a moderate correlation with the Children's Depression Inventory (CDI) ($r=0.411$; $p=0.001$), suggesting a relationship between dysfunctional eating behaviors and depressive symptoms.

Furthermore, the data show a significant increase in BMI during hospitalization, highlighting the importance of targeted therapeutic interventions.

These findings contribute to enhancing diagnostic and therapeutic strategies in the management of patients with AN.

Keywords: Anorexia nervosa, Psychiatric comorbidity, Anxiety, Depression, Outcome.

INTRODUCTION

Feeding and Eating Disorders (FED) encompass a group of pathological conditions characterized by significant alterations in food intake. The Diagnostic and Statistical Manual of Mental Disorders text revised (DSM-5 TR) included six diagnostic categories: Pica, Rumination Disorder, Avoidant/Restrictive Food Intake Disorder (ARFID), Anorexia Nervosa (AN), Bulimia Nervosa (BN), and Binge Eating Disorder (BED). These are complex disorders involving both physical and psychological aspects. AN is characterized by relevant clinical aspects involving both the somatic and psychological aspects. The diagnostic criteria for AN, according to the DSM-5 TR, are the following: 1) restriction in food intake that causes significant weight loss; 2) intense fear of gaining weight even when the individual is already significantly underweight or persistent behaviors that interfere with weight gain and 3) distortion of body image and excessive influence on self-esteem levels with failure to recognize underweight conditions (DSM 5 – TR, American Psychiatric Association, 2022). In 2010, Steinhausen and Jensen reported that the most common age of onset ranged from 12 to 15 years, while in 1995 the age of onset was between 16 and 19 years. Determining the prevalence and incidence of AN is challenging, as many studies report combined data for children and adolescents. In the United Kingdom, the prevalence of AN in children aged 10 to 14 years increased from 2.5 per 100,000 children in 2000 to 7.5 per 100,000 in the last two decades (Holland *et al*., 2016). In Italy, the Italian Society of Pediatrics (SIP) addressed this issue, highlighting the growing risk of developing eating disorders from preadolescence (Banderali G., Società

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Italiana di Pediatria, 2021). The onset of eating disorders typically occurs during adolescence, with the highest prevalence among girls, although eating disorders can also affect children between 5 and 12 years of age (Golden *et al*., 2016). Younger children are increasingly exposed to risk factors related to social pressures, social media trends, and the aesthetic models promoted by contemporary culture (Linee guida per la diagnosi e il trattamento dell'anoressia nervosa, Ministero della Salute, 2017). Early puberty and the interaction with social media, which often promote unrealistic beauty ideals, appear to contribute to this trend. Recent scientific research has also identified social network use as a critical risk factor in the development of eating disorders, particularly by promoting extreme thinness in girls, which makes this population more vulnerable and hampers their psychosocial and psychophysical development (Lozano Munoz *et al*., 2022).

In a National Survey, cases of eating disorders increased from 680,569 in 2020 to 1,450,567 in 2023. Overall, the number of people receiving treatment for these conditions today exceeds 3 million (Dalla Ragione L., Survey Nazionale, Ministero della Salute, 2023). Risk factors, which include genetic, social, environmental, biological, and psychological elements, not only influence the onset of a single disorder but also play a crucial role in the emergence of psychiatric comorbidities such as depressive disorder, obsessive-compulsive disorder, anxiety disorders, bipolar disorder, mood disorders, psychosis, and even specific personality disorders (Catone G., 2021; Micali *et al*., 2015).

Depressive symptoms are often identified at the AN onset and may be carefully evaluated to determine whether they meet the DSM-5 criteria for depressive disorder. Key symptoms include flattened mood, guilt, hopelessness, and feelings of worthlessness, low self-esteem, difficulty managing eating patterns, irritability, insomnia, and suicidal ideation. In general, it is not simple determining whether depressive symptoms precede AN or whether some effect of eating psychopathology contributes to the development of a chronic depressive state, such as neurometabolic alterations (Catone G., 2021). There is evidence that anorexia nervosa, depression, and suicide attempts may share a strong common genetic predisposition (Thornton *et al*., 2016).

Moreover, anxiety symptoms are frequently reported among subjects with AN. Key symptoms include excessive worry, agitation, difficulty concentrating, muscle tension, panic, avoidance of social and eating situations, and intense fear of losing control. Anxiety can negatively affect the management of eating behaviors and emotional regulation. Demonstrated a positive relationship between nutritional status markers and anxiety and depressive symptoms (Pleple A. *et al*. 2021).

In 2020, a clinical study on 72 patients with eating disorders focused on psychiatric comorbidities in adolescents. The data analysis revealed that social anxiety and depression were the most common categorical comorbidities in young patients with eating disorders. Moreover, Authors found that patients acknowledged and accepted symptoms of social anxiety but tended to deny depressive symptoms (Catone *et al*., 2020). In clinical practice, the tendency to underestimate the presence of psychiatric comorbidity in eating and feeding disorders can have negative consequences. In fact, patients could be exposed to ineffective and sometimes harmful treatments that often divert attention from addressing the mechanisms underlying the eating disorder psychopathology (Dalla Grave R. *et al*., 2019). Again, AN has the higher mortality risk than other psychiatric disorders, while comorbidity is considered a risk factor for mortality in AN, in association with demographic and socioeconomic factors (Ulfvebrand S. *et al*., 2015).

In this scenario, the early recognition and the full clinical assessment of these disorders can significantly contribute to the efficacy of clinical management of AN, emphasizing the importance of integrated work within a multidisciplinary team. In the light of these considerations, scientific contributions aimed to provide insight into the relationship between AN and these comorbidities could provide further evidence on the association between AN and psychiatric comorbidities and improve diagnostic and treatment strategies developing more personalized and specific therapeutic protocols.

The main focus of the present study is to highlight the internalizing psychiatric comorbidities rate among adolescents with AN. Specifically, this study aims to assess the prevalence and clinical characteristics of associated psychiatric disorders such as anxiety and depressive disorders in a cohort of patients with AN with some insights into treatment outcomes (secondary goal).

In particular, the assessment of the prevalence and clinical characteristics of associated disorders plays a crucial role in managing the psychopathological core of the disease, particularly within an integrated and multidisciplinary team. A multidimensional approach allows for the analysis of the various psychological, emotional and behavioral components of the patient, facilitating the identification of comorbidities and the personalization of therapeutic interventions. This approach enables the development of targeted therapeutic strategies, optimizing treatment efficacy and ensuring an overall improvement in clinical outcomes.

METHODS

Study design

The study had an observational and retrospective design. The sample was selected through the review of medical records of patients admitted to the Department of Child Neuropsychiatry at Vanvitelli University between January 2020 and May 2024. The inclusion criteria were: diagnosis of Anorexia Nervosa (AN) according to DSM-5, age between 10 and 18 years, BMI < 17.5 kg/m^2. The exclusion criterion was the presence of an incomplete routine psychodiagnostic evaluation. This included: psychopathological assessment of eating disorders and body image, dimensional assessment of anxious and depressive symptoms, and cognitive assessment. The medical record review also included the analysis of clinical and socio-demographic data.

Being a retrospective study, ethical committee approval was not required. All patients involved provided informed consent for routine clinical activities conducted in the department.

The data were anonymized, and the study adheres to the principles established by the Declaration of Helsinki.

Instruments

Eating Attitude Test 26 (EAT-26). The EAT-26 is a self-report questionnaire designed to identify symptoms and behaviors related to AN. This tool is useful for identifying DSM-5 Criterion A, which involves caloric restriction. Additionally, it examines the intensity of the fear of gaining weight (Criterion B) and body image distortion (Criterion C), both essential for diagnosing AN. The test uses a six-point Likert scale based on the frequency with which the individual engages in specific behaviors. The total score is calculated by summing the scores, with a value of 20 or higher (cut off) indicating a high risk for an eating disorder (Garner M. D. *et al*., 1982).

Body Uneasiness Test (BUT). The BUT is a self-report questionnaire used to assess body image disturbance, divided into two parts: the first part (BUT A) includes 34 items and evaluates weight phobia, concern about body image, compulsive control, avoidance behaviors, and feelings of detachment and depersonalization toward one's body; the second part (BUT B) includes 37 items and assesses concerns regarding specific parts of the body. In addition to the total score (BUT total), the Global Severity Index (GSI) can be calculated as the sum of the clinical scale scores divided by the number of clinical items (34). A GSI score above 1.20 is indicative of significant body image concerns (Cuzzolaro M. *et al*., 2006).

Screen for Child Anxiety Related Emotional Disorders (SCARED). The SCARED is a self-report screening questionnaire for anxiety symptoms, developed in 1997, designed for youth aged 9 to 18 years and their parents. The test consists of 41 items, each rated on a 3-point Likert scale; a total score of 25 or higher suggests the presence of clinical significative anxiety and may indicate the need for further evaluation. It was developed as a tool that includes multiple categorizations according to DSM-IV anxiety disorders: somatic/panic, generalized anxiety, separation anxiety, social phobia, and school phobia (Scaini S. *et al*., 2017).

Children's Depression Inventory (CDI). The CDI is a self-report depressive symptoms scale for individuals aged 8 to 17 years. It assesses a wide range of symptoms, including mood disturbances, the ability to experience pleasure, vegetative functions, self-esteem, and social behavior. Each of the 27 items in the test offers three response alternatives that the subject selects based on "the ideas and feelings experienced in the last two weeks." Scores for each item range from 0 to 2, with the total score ranging from 0 to 54, where higher scores indicate greater severity of depressive symptoms. A total score of 19 or higher is considered indicative of clinically significative depressive symptoms (Kovact M. *et al*., 1992).

The Wechsler Intelligence Scale for Children – Fourth Edition (WISC-IV). The WISC-IV is the most widely used test for the evaluation of cognitive performance in children aged between 6 to 16 years.

The WISC-IV includes a general cognitive profile and further descriptive indices: verbal comprehension index (VCI); perceptual reasoning index (PRI); working memory index (WMI); processing speed index (PSI) (Orsini, A. *et al*., 2012; Weiss L.M., 2006).

STATISTICAL ANALYSIS

In order to describe the sample, the descriptive analyses with frequencies/percentages for categorical variables and mean/standard deviation and range for numerical variables were performed. In reference to the BMI variable, the sample was further divided into 4 categories according to the DSM-5 severity index: BMI > 17 kg/m² (mild); BMI 16-19.99 kg/m² (moderate); BMI 15-15.99 kg/m² (severe); BMI < 15 kg/m² (extreme). Regarding the clinical scale scores (EAT-26, BUT, SCARED, CDI), the frequencies and percentages of those who exceeded the cut-off results were also considered. For the purposes of evaluating the first objective (analysis of psychiatric comorbidities in the cohort), a Pearson correlation analysis was performed between the total scores of: eating psychopathology (EAT-26); body image disturbance (BUT); depressive symptoms (CDI); and anxiety symptoms (SCARED). For the analysis of the treatment outcome we selected the variation of BMI between admission and discharge. A paired sample t-test was used to compare the mean BMI values at the two time points. Statistical significance was set at p 0.05.

RESULTS

60 patients (57 females – 95%, 3 males – 5%) constituted the final sample. Mean age was 13.9 years (SD = 1.537; age range 10-17 years). The duration of hospitalization ranged from 12 to 114 days, with a mean of 45.92 days (SD = 19.896). Mean BMI at admission was 15.9 (SD= 2.1; range 11.5-21.6) whereas BMI at discharge was 17.2 (SD 1.6; range 13.9-22). Mean QI was 95.55 (SD= 19.028; range 51-154). The scores on the EAT-26 test had a mean of 39.92 (SD=19.38; range: 3–74). The scores on the BUT test had a mean of 2.60 (SD=19.185; range 0.04-4.85). The SCARED test scores had a mean of 35.92 (SD=13.56; range 2-65) The CDI test scores had a mean of 29.18 (SD=18.63; range 3-78). Table **1** shows these results.

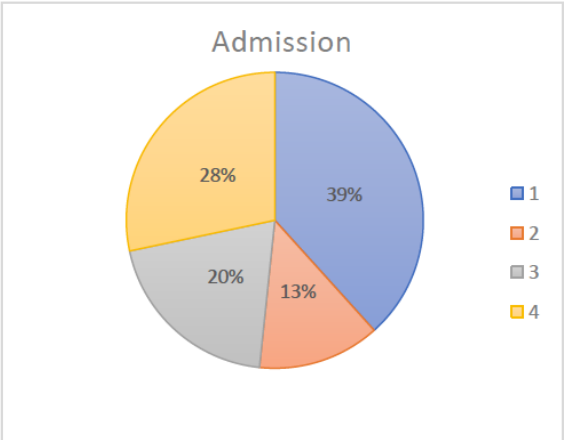
At the time of admission, according to DSM 5 severity index, 38.3% of patients (n=23) were classified in the extreme severity category of BMI at admission, 13.3% of patients (n=8) were classified as “Severe”, 20.0% of patients (n=12) had a “Moderate” severity and 28.3% of patients (n=17) had a “Mild” severity. At discharge, 6.7% of patients (n=4) were classified in the extreme severity category of BMI at discharge, 13.3% of patients (n=8) were classified as “Severe”, 2.3% of patients (n=17) had a “Moderate” severity and 51.7% of patients (n=31) were categorized as “Mild”. The Graphs **1** and **2** display these results.

48 (80%) and 51 (85%) participants obtained significant scores at the EAT 26 and BUT. Moreover, 46 (76.7%) and 39 (65%) exceeded the clinical cut-off

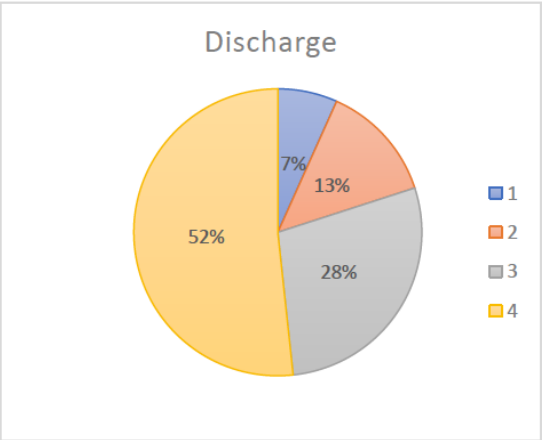
Table 1: Provides an overview of the Clinical and Psychopathological Characteristics of Patients with Anorexia Nervosa in the Sample

	N	Minimum	Maximum	Mean	Standard Deviation
Age (years)	60	10	17	13,90	1,537
Length of hospitalization (days)	60	12	114	45,92	19,896
Weight at admission (kg)	60	26,2	60,1	39,815	7,5285
BMI at admission	60	11,5	21,6	15,990	2,1999
Weight aat discharge (kg)	60	30,40	63,50	43,0425	6,32699
BMI at discharge	60	13,9	22,0	17,228	1,6180
QI	60	51	154	95,55	19,028
EAT-26	60	3	74	39,92	19,387
BUT	60	,04	4,85	2,6058	1,18526
SCARED	60	2	65	35,92	13,561
CDI	60	3	78	29,18	18,635

BMI: Body Mass Index; EAT-26: Eating Attitude Test-26; BUT: Body Uneasiness Test; SCARED: Screen for Child Anxiety Related Emotional Disorders; CDI: Children Depression Inventory.



Graph 1



Graph 2

Graphs 1 and 2: show the distribution of BMI at admission and discharge according to DSM-5 diagnostic criteria in 4 severity levels.
Legend; 1 = Extreme: BMI < 15 kg/m2; 2 = Severe: BMI 15-15.99 kg/m2; 3 = Moderate: BMI 16-19.99 kg/m2; 4 = Mild: BMI > 17 kg/m2.

of SCARED and CDI respectively. Table **2** summarizes these results.

Table 2: Frequencies and Percentages of Subjects Exceeding Clinical Cut Off for Eating and Body Image Psychopathology and Dimensional Anxiety and Depression

Test	Frequencies (Percentages)	Cut Off
BUT	9 (15%)	<1.20
	51 (85%)	>1.20
EAT-26	12 (20%)	<20
	48 (80%)	>20
CDI	21 (35%)	<19
	39 (65%)	>19
SCARED	14 (23.3%)	<25
	46 (76.7%)	>25

EAT-26: Eating Attitude Test-26; BUT: Body Uneasiness Test; SCARED: Screen for Child Anxiety Related Emotional Disorders; CDI: Children Depression Inventory.

Correlation analyses showed positive and significant associations between the core symptoms of AN (EAT-26 and BUT) and dimensional anxiety (SCARED) and depression (CDI). The correlation between the EAT 26 and SCARED test was positive and moderately significant (r=0.505, p<0.0001), indicating an association between dysfunctional eating behaviors and high levels of anxiety. The correlation between the EAT-26 and CDI tests showed a positive and moderate coefficient (r = 0.411, p = 0.001), suggesting a relationship between dysfunctional eating behaviors and depressive symptoms in the participants. Similarly, the correlation between the BUT and SCARED test (r = 0.561, p < 0.001) and the BUT and CDI test (r = 0.515; p < 0.001) suggested that participants dissatisfied with their bodies also tend to exhibit high levels of anxiety and depressive symptoms. A strong positive correlation was found between the EAT-26 and BUT scores (r=0.730; p <0.001). This suggests that participants reporting dysfunctional eating behaviors also tend to show high

Table 3: Correlation Analysis between Eating Psychopathological Dimensions and Internalizing Disorders (Anxiety/Depression)

	EAT-26	BUT	CDI	SCARED
EAT-26	1	,730**	,411**	,505**
BUT	,730**	1	,515**	,561**
CDI	,411**	,515**	1	,294*
SCARED	,505**	,561**	,294*	1

EAT-26: Eating Attitude Test-26; BUT: Body Uneasiness Test; SCARED: Screen for Child Anxiety Related Emotional Disorders; CDI: Children Depression Inventory

**. The correlation is significant at the 0.001 level;
*. The correlation is significant at the 0.005 level.

body image dissatisfaction. Finally, although weaker, a positive correlation was found between the CDI and SCARED tests ($r = 0.294$; $p = 0.023$), indicating a relationship between depressive and anxiety symptoms, although less pronounced compared to other correlations observed. Table **3** displays these results.

The difference between mean BMI at admission (15.9) and discharge (17.3) was significant ($p<0.001$). This result indicates an increase in BMI during the hospitalization phase, suggesting an improvement in body weight among participants during treatment and the clinical evaluation assessment period.

DISCUSSION

This study aims to investigate the presence of psychiatric comorbidities in patients diagnosed with anorexia nervosa (AN). Specifically, the study includes a descriptive analysis of the clinical and sociodemographic characteristics of a sample comprising 60 patients aged 10 to 17 years including anxiety and depressive comorbidity.

In our sample, 76.7% and 65% of the participants presented clinical scores on dimensional anxiety and depression respectively. The results of the correlation analyses reveal a significant relationship between eating disorders and internalizing problems such as anxiety and depression. Specifically, individuals exhibiting dysfunctional eating behaviors tend to report high levels of body image dissatisfaction, which are both associated with elevated level of anxious and depressive symptomatology. The study findings confirm the high rate of psychiatric comorbidity associated with AN, consistent with existing literature. AN typically has its onset in late adolescence, whereas anxiety disorders often emerge during childhood or early adolescence. Some authors suggest that the cognitive and behavioral symptoms of AN might alleviate pre-existing anxiety symptoms, thereby reinforcing the eating disorder itself (Catone G., 2021). Epidemiological studies have demonstrated a high prevalence of anxiety disorders both in patients with AN and in their relatives, indicating a significant link between the conditions (Kaye *et al*., 2004; Swinbourne *et al*., 2012). Furthermore, prospective studies have suggested that childhood anxiety may increase the risk of developing AN, although it is not the sole determinant (Meier *et al*., 2015; Lloyd *et al*., 2020). The prevalence of depressive and anxious symptoms observed suggest that these conditions should be evaluated as integral components of the clinical picture, requiring targeted interventions not only for the symptoms of AN but also for the comorbidities that may hinder treatment.

In this study, the strong correlation between EAT-26 and BUT scores suggest an intrinsic link between attitudes toward eating and body dissatisfaction, emphasizing the need for an integrated therapeutic approach that addresses both the psychological and behavioral aspects of the disorder.

These findings highlight the importance of thorough psychodiagnostic evaluation using standardized psychometric tools to improve clinical outcomes in patients with AN. The prevalence of depressive and anxious symptoms observed indicates that these conditions must be considered as integral components of the clinical picture, necessitating targeted interventions that address not only AN symptoms but also the comorbidities that may avoid treatment.

Our data confirm the lowering of the age of onset of AN (mean age 13,9; SD 1,5; range 10-17), as extensively reported in recent literature. Favaro *et al*. (2009) highlighted that both in AN and Bulimia Nervosa (BN), the age of onset has shown a significant decrease over birth cohorts. The onset age for AN and BN continues to decline in younger generations.

Furthermore, our study revealed a broad variability in the duration of hospitalization, with a mean of 46 days and a range from a minimum of 12 days to a maximum of 114 days. This variability underscores the complexity and severity of AN treatment, which requires personalized interventions tailored to the individual clinical response. Inpatient rehabilitative treatment must be sufficiently long to allow for normalization of body weight, improvement of specific eating disorder psychopathology (Dalla Grave R., 2015). According to the Italian Ministry of Health guidelines for the diagnosis and treatment of AN (2017), five levels of intervention are available in Italy for the management of eating disorders: primary care physicians or pediatricians; outpatient therapy, intensive outpatient or day hospital therapy; intensive residential rehabilitation and ordinary or emergency hospitalizations.

Nutritional rehabilitation in eating disorders, across all levels of treatment, must be conducted within an integrated multidisciplinary approach. This approach combines psychiatric/psychotherapeutic treatment with nutritional interventions. The guidelines emphasize the

importance of a care pathway tailored to the specific needs of each patient. This pathway should not be limited to the acute phase but must include long-term follow-up to prevent relapses and ensure stable and lasting recovery. Moreover, the treatment must address complex psychosocial challenges such as difficulties in interpersonal relationships, family conflicts and stress management, which often complicate the rehabilitation process.

In our sample, the mean BMI at admission of 15.9 falls within the indicative range for AN, as a BMI below 17.5 is often considered an indicator of severe malnutrition and a clinical red flag. In pediatric patients, BMI evaluation must be contextualized using standardized growth charts, as the normal BMI range varies with age and sex. In our study, 38.3% of subjects fell into the “extreme” category, while 13.3% were categorized “severe”, amounting to a total of 51.6%.

One significant result of the study is the increase in Body Mass Index (BMI) during hospitalization, rising from 15.99 at admission to 17.23 at discharge. This improvement in BMI underscores the effectiveness of the therapeutic strategies employed within the healthcare setting for the treatment of AN. However, monitoring the weight stability over the long term is mandatory for AN subjects. Calugi and Dalla Grave (2016) suggest that clinicians should recognize that patients who fail to achieve a normal weight (BMI 18.5-24.9) are at increased risk of developing severe medical complications and psychological damage, which can significantly impair quality of life. In our experience, we believe it is important to enhance the function of hospitalization also for the therapeutic aspects of containment of anxiety, including parental anxiety. Furthermore, during hospitalization it is possible for the specialist to observe the interactive dynamics mother-daughter/son that are very interesting from a diagnostic and therapeutic usefulness.

In conclusion, the results of this study emphasize the necessity of a multidimensional integrated approach for managing AN, incorporating psychiatric, psychological and nutritional interventions to improve prognosis and enhance the quality of life for patients. This study has several limitations that must be considered when interpreting its findings. First, the retrospective design limits the ability to establish causal relationships between the variables. Additionally, another limit is the absence of a semi-structured interview, which could have complemented the self-reported data from the various measures, providing a more comprehensive and in-depth understanding of the collected information.

The small sample size restricts the generalizability of the results, suggesting that further studies with larger samples are needed to confirm our findings. The 10-17 range includes subjects with very different psychological development profiles from late latency to full adolescence, especially in terms of the ability to communicate problems related to body shape and weight, anxious and depressive symptoms. Finally, the use of the self-report measures may introduce biases related to participants such as self-reflection, which could affect the accuracy of the collected data.

CONFLICTS OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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