The association between personality and eating psychopathology in inpatients with anorexia nervosa

JOURNAL OF PSYCHOPATHOLOGY
2018;24:125-132

Original article

E. Marzola[1], N. Delsedime[1], S. Scipioni[1], S. Fassino[1], G. Abbate-Daga[1], B. Murray Stuart[2]

[1] Eating Disorders Center, Department of Neuroscience, University of Turin, Italy; [2] Department of Psychiatry, University of California, San Francisco, San Francisco, CA, USA

The association between personality and eating psychopathology in inpatients with anorexia nervosa

Summary

Objectives

Anorexia nervosa is a severe mental illness with modest treatment outcomes, and hospitalizations are frequently required. AN is robustly associated with a constellation of personality traits, including perfectionism, harm avoidance and anxiety. Psychopathological and personality aspects can influence treatment response and outcome in the hospital setting potentially favoring a greater individualization of treatments. This study aims to analyze inpatients with AN to ascertain as to whether personality traits can be associated with the improvement of eating psychopathology. We expected that more adaptive personality traits upon admission could correlate with the improvement of eating psychopathology upon hospital discharge.

Methods

One-hundred and thirteen inpatients with AN were consecutively enrolled and asked to complete the following assessment instruments: Temperament and Character Inventory (TCI), State Trait Anxiety Inventory (STAI), Beck Depression Inventory (BDI), Eating disorders inventory-2 (EDI-2), and the Eating Disorders Examination Questionnaire (EDE-Q). Clinical parameters including Body Mass Index (BMI) were assessed at admission as well.

Results

When compared between admission and discharge, patients significantly improved in BMI, state anxiety and depression. As regards eating psychopathology, patients did not significantly improve on the EDI-2 core subscales (i.e., drive for thinness, bulimia, body dissatisfaction), with the exception of the bulimia subscale; in contrast, the EDE-Q total score showed a significant improvement upon discharge. According to their improvement (Improved Drive For Thinness, I-DT) versus worsening (Worsened Drive for Thinness, W-DT) of the DT subscale upon hospital discharge, 46 patients were classified as W-DT while 67 patients as I-DT. Only cooperativeness on the TCI was found to significantly differ between groups.

Conclusions

Increasingly effective and individualized treatments are needed for AN sufferers. We confirmed that hospitalizations are overall effective in improving eating symptoms; furthermore, higher cooperativeness upon admission, a character dimension of personality, resulted as associated with the improvement of drive for thinness upon discharge. A deeper psychopathological characterization of patients with AN could be helpful in planning treatments for AN patients.

Key words

Temperament • Drive for thinness • Cooperativeness • Hospitalization • Treatment outcome

Correspondence

Giovanni Abbate-Daga
Department of Neuroscience, University of Turin, via Cherasco 15, 10126 Turin, Italy
• Tel. +39 011 6335196 • Fax +39 011 6335749
• E-mail: giovanni.abbatedaga@unito.it

Introduction

Anorexia nervosa (AN) is a severe psychiatric disorder [1] for which the precise etiology remains elusive. Moreover, AN features severe medical sequelae [2], and demonstrates the highest rates of mortality among any psychiatric illness [3], and high psychiatric comorbidity with other psychiatric conditions [4]. Importantly, AN is robustly associated with a particular

constellation of personality traits, which may provide clues to the elusive neurobiology of AN, since these traits are neurally encoded.

Personality has been strongly linked to the development and maintenance of AN [5], and personality traits ought to be taken into account as potentially impacting on outcome in AN. For example, neuroticism and perfectionism have been acknowledged as risk factors for eating disorders [6]. With more detail, temperament in AN is typically characterized by heightened anxiety, marked cognitive inflexibility, high harm avoidance [6-8] mirroring the alterations of the neural circuit functions found in AN [9]. Moreover, such characteristics tend to persist after recovery [6 10] and need to receive close attention when planning treatments. Treatment models focused on temperament [11] and personality [12] have been proposed, and personality traits also predict outcome in outpatient setting [13]. Also, cognitive-behavioral [14] and psychodynamic [15] treatments positively modulate personality traits as well. However, it remains unclear as to whether changes in personality traits favor the improvement of symptoms or vice versa. Still, personality traits can impact on treatment compliance [7], possibly influencing those feelings of refusal and anger typical of a subgroup of patients with eating disorders [16].

The thorough explication of personality traits among patients with AN offers much promise, in both developing precision treatments, and discerning who may benefit from specific treatments [11]. However, a key endeavor in expanding this body of evidence relates to the delineation of state- versus trait-level risk or maintaining factors in AN, as it relates to personality traits. Indeed, state-related neurocognitive effects of starvation are profound [17], portending both morphological and functional brain perturbations [18]. As such, the careful delineation of state versus trait related personality variables in AN is of critical importance, since some evidence suggests a change in personality trait expression in those with AN upon recovery [19]. While most studies of personality structure in those with AN have been conducted in outpatient settings [7], or those recovered from the illness [10], an important gap currently relates to the personality structure of AN patients in acute settings.

Urgent hospitalizations are often required in the treatment of AN, given the propensity for rapid medical complications [2]. Broadly speaking, these admissions can be effective over the short-term [20], and particularly in those patients whose life-threatening condition requires involuntary treatment [21]. However, hospitalization admissions typically impact mostly on weight restoration and regularization of clinical parameters (i.e., blood tests [22]), rather than on the cognitive symptoms of AN. In fact, it is well-known that about one-third of inpatients with AN significantly improve their weight but not their overall eating symptomatology, as measured by EDI-2 upon discharge [23]. Therefore, it would be of clinical importance to identify early predictors of treatment response with respect to patients' eating psychopathology, independently of patients' clinical improvement. This would allow to sustain the improvement of both weight and clinical parameters over time.

A core feature of AN is encapsulated in the drive for thinness (DT), which refers to the ubiquitous and relentless pursuit of the thin ideal. An elevated drive for thinness is typical of those affected by both AN and bulimia nervosa (BN); in fact, sufferers report marked fear of weight gain with the strong tendency to restrictive eating [24 25]. This core dimension of AN appears resistant to improvement during a brief and acute hospitalization, where a period of rapid weight gain is common [26]. Earlier research showed that DT in individuals with AN or BN directly correlates with the degree of eating disorder-related psychopathology, suggesting that DT is a potential predictor of relapse [27]. Additionally, DT is robustly associated with disordered eating and intentional weight loss as well [28]. Interestingly, DT also significantly correlated with those structural brain changes (neuroanatomical signatures) that are early associated with AN in a machine learning approach model [29].

Psychopathological and personality aspects are considered factors influencing treatment response and outcome in programmed hospitalizations [30 31]; notwithstanding, data on emergency hospitalizations are scarce. A better understanding of these variables could allow a greater individualization of treatments and therefore a more positive response to emergency admissions, mostly in regard to this core psychopathological element of the disorder.

The aim of this study is to analyze a group of inpatients with AN whose clinical severity required an emergency admission to an Eating Disorders Unit in order to ascertain as to whether personality traits can be associated with the improvement of eating psychopathology as measured by the DT subscale of the EDI-2 [32]. We expected that more adaptive personality traits upon admission could correlate with the improvement of eating psychopathology modulating patients' fear of weight gain.

Materials and methods

Participants

We consecutively enrolled 113 adult and female inpatients diagnosed with AN both subtypes (79 with restricting AN [R-AN] and 34 with binge-purging AN [BP-AN]) according to DSM-5 criteria [33] between March 2014 and November 2017 at the ward for Eating Disorders of the "Città della Salute e della Scienza" Hospital of the Uni-

versity of Turin, Italy. Participants had to meet the following inclusion criteria: a) age > 18 and < 55 years old; b) female gender; c) no substance dependence; d) no psychosis or psychotic symptoms according to DSM-5 criteria [33].

Participants were all Caucasian. All participants completed the assessments within the first week of hospitalization to minimize confounders due to treatment interventions. All participants provided written informed consent.

The hospitalization intervention

All patients were hospitalized because of emergency reasons; therefore, the aims of this intervention were to achieve medical stabilization and re-feeding and to provide psychosocial interventions in order to motivating patients to the following treatment steps (i.e., partial hospitalization or outpatient services).

Therefore, during hospitalization, patients were provided with individualized treatment plans [34] improving patients' overall motivation to treatment. The clinical team included psychiatrists, clinical psychologists, nurses, a registered dietitian and an internal medicine physician.

Weight restoration (including parenteral and enteral re-feeding when needed) is intended as a first-step intervention in order to minimize the life-threatening risks due to severe malnutrition. Weight restoration is strictly monitored in order to avoid the refeeding syndrome. Five structured meals are provided (breakfast, half-morning snack, lunch, mid-afternoon snack and dinner) and more snacks can be administered according to individualized treatment plans. Blood tests and ECG were frequently performed per clinical evaluation.

Psychiatric visits are intended to assess the presence of psychiatric comorbidities and to investigate the medical issues related to psychopharmacology. Moreover, patients are provided with daily individual motivational sessions, daily individual psychotherapy and weekly psycho-educational and cognitive-behavioral groups in order to improve their compliance, motivation, therapeutic alliance and mobilize as much as possible inpatients' resources. Support to parents or significant others is offered to all patients.

Before discharge, all patients receive detailed clinical information about potential strategies to put in place at home in order to avoid relapses.

Measures

A trained nurse measured patients' height and weight upon admission (T0) and discharge (T1) to calculate Body Mass Index (BMI). Participants were asked to complete the following self-report assessments:

1. the Temperament and Character Inventory (TCI). The TCI [35] is a 240-item self-administered questionnaire divided into 7 dimensions. Four of these dimensions assess temperament: novelty seeking (NS), harm avoidance (HA), reward dependence (RD), and persistence (P). The other three dimensions assess character: self-directedness (SD), cooperativeness (C), and self-transcendence (ST). The TCI showed sound psychometric properties [36];
2. State Trait Anxiety Inventory (STAI). The STAI [37] is a well-established 20-item self-report instrument for the state and trait anxiety. All items are rated on a 4-point scale. The STAI measures two types of anxiety: state anxiety, a temporary condition experienced in specific situations, and trait anxiety, a general tendency to perceive situations as threatening. Total scores for state and trait sections separately range from 20 to 80, with higher scores indicating higher levels of anxiety;
3. Beck Depression Inventory (BDI). The BDI [38] is a 13-item self-report questionnaire evaluating depressive symptoms. Scores from 0 to 4 represent minimal depressive symptoms, scores of 5-7 indicate mild depression, scores of 8-15 indicate moderate depression and scores of 16-39 indicate severe depression;
4. Eating disorders inventory-2 (EDI-2). The EDI-2 [32] is a psychometrically sound self-report evaluation of disordered eating patterns, behaviors and personality traits shared by individuals affected by an eating disorder (ED). Ninety-one items and eleven subscales assess both symptoms and psychological correlates of EDs. Each item can be rated on a 6-point response scale; the higher the score, the more elevated eating psychopathology. Drive for thinness (seven items), bulimia (seven items) and body dissatisfaction (nine items) represent the 'symptom index'. Participants were divided in two groups according to the improvement (I-DT) versus worsening (W-DT) of the DT subscale upon hospital discharge;
5. the Eating Disorders Examination Questionnaire (EDE-Q [39]) is a 28-item self-report questionnaire with high internal consistency that provides a measure of characteristics and severity of eating disorder features. Four subscales are available: Restraint, Eating Concern, Shape Concern, and Weight Concern but only the total score has been included in this study.

Statistical analysis

The SPSS 24.0 statistical software package (IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp) has been used for data analysis. Paired sample t-test has been used to verify any significant changes occurred between hospital admission and discharge. A repeated measures ANOVA has been conducted to assess DT changes between I-DT and W-DT groups.

Independent samples t-test have been applied to continuous variables (i.e., clinical data and questionnaires). Fisher's exact test has been used for categorical variables to maximize reliability independently of cell counts. Statistical significance has been set at 0.05.

Results

Socio-demographic and clinical characteristics of the sample

Twelve patients had to be excluded since males, 5 patients were discarded given their psychotic comorbidity and 9 patients failed to successfully complete the self-report battery of assessment. Therefore, the total sample was finally composed by 113 women affected by AN both subtypes: 79 with R-AN and 34 with BP-AN. Mean BMI was 14.27 ± 1.8, mean age was 24.5 ± 9.4 years, mean duration of illness was 6.8 ± 8.6 years, and mean duration of hospitalization 36.3 ± 17.1 days.

AN subtypes significantly differed only on duration of illness (R-AN: 5.43 ± 7.72 versus BP-AN 9.64 ± 9.72, t = -2.45, p = 0.016) but not with respect to age, BMI, duration of hospitalization and caloric intake upon admission (data not shown). With respect to general and eating psychopathology, R-AN and BP-AN groups differed in TCI self-directedness, trait-anxiety, and EDE-Q total score (data not shown).

Clinical outcomes for hospitalized patients with AN

Patients significantly improved in BMI, state anxiety and depression at discharge. Trait anxiety did not change in a statistically significant way (Tab. I).

As regards eating psychopathology, patients did not significantly improve on the EDI-2 core subscales (i.e., drive for thinness, bulimia, body dissatisfaction), with the exception of the bulimia subscale (Tab. I); in contrast, the EDE-Q total score showed a significant improvement upon discharge.

Relationship between personality and hospitalization outcome

According to the improvement versus worsening of the DT subscale upon hospital discharge, 46 patients were classified as W-DT (T0 11.89 ± 7.32, T1 14.87 ± 7.23, t = -6.774, p < 0.001) while 67 patients as I-DT (T0 12.95 ± 8.18, T1 10.02 ± 8.1, t = -5.398, p < 0.001). W-DT and I-DT groups had a significant impact on changes in DT (groups x time F 59,801; p < 0.001; see Figure 1).

Only the cooperativeness personality trait was found to significantly differ between W-DT and I-DT groups (see Table II). No other significant differences could be found either on clinical variables, diagnostic subtypes (Fisher's exact test p = 1), or on the TCI and other questionnaires used (Tab. II).

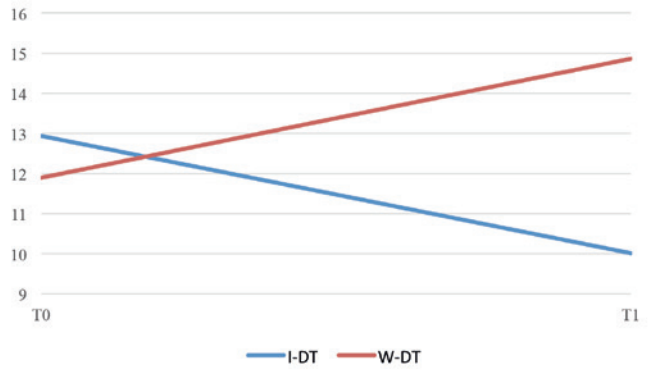
Discussion

A psychopathological characterization of patients with AN is needed in order to provide increasingly effective and individualized treatments for those who suffer from such a severe disorder and tend to be hospitalized after an emergency admission. This study showed that hospitalizations are overall effective in improving eating symptoms; moreover, higher cooperativeness, a char-

TABLE I. *Clinical changes between hospital admission and discharge of patients with anorexia nervosa.*

	AN patients (n = 113)		Test statistics	
	T0	T1	t	p
Weight	37.23(5.69)	39.20(5.04)	-8.473	0.001
BMI	14.27(1.84)	15.05(1.59)	-7.606	0.001
Caloric intake	660.63(338.79)	1570.83(361.41)	-19.723	0.001
EDI-2				
DT	12.54(7.83)	11.92(8.07)	1.307	0.194
B	3.04(4.45)	1.58(2.86)	4.195	0.001
BD	14.73(7.23)	14.41(7.37)	0.697	0.487
STAI-State	55.65(14.31)	51.81(15.96)	3.087	0.003
STAI-Trait	57.59(12.94)	55.43(15.68)	1.842	0.069
BDI	15.78(8.04)	11.59(8.26)	6.024	0.001
EDE-Q-TOT	3.48(1.68)	2.76(1.68)	6.656	0.001

AN: anorexia nervosa; BMI: body mass index; EDI-2: Eating disorders inventory-2; DT: drive for thinness; B: bulimia; BD: body dissatisfaction; STAI: State Trait Anxiety Inventory; BDI: Beck Depression Inventory; EDE-Q-TOT: Eating Disorders Examination Questionnaire total score



I-DT: improved drive for thinness (I-DT); W-DT: worsened drive for thinness

FIGURE 1. *Changes in drive for thinness at hospital admission (T0) and discharge (T1) of the groups with improved (I-DT) versus worsened (W-DT) drive for thinness.*

acter dimension according to the TCI model of personality [35], resulted as associated with the improvement of DT after urgent hospital admission, a core psychopathological dimension of AN, as measured by the EDI-2 [32]. AN is plagued by marked mortality, with a standardized mortality ratio as high as 6 and 20% of deaths caused by suicide [40]. Therefore, hospitalizations are frequently required for both psychiatric and medical acute stabilization. A main goal of hospitalization is weight restoration, since starvation-related medical complications are a leading cause of mortality in AN, and moreover, body weight is a well-known predictor of readmission and relapse [41].

Urgent hospitalization is common in clinical practice and entails treating patients with different degrees of compliance and motivation. Clinical trials usually include patients who seek treatment in order to restore

TABLE II. *Differences in baseline characteristics between patients with anorexia nervosa who improved versus worsened their scores of drive for thinness upon hospital discharge.*

	I-DT (n = 67)	W-DT (n = 46)	Test statistics	
			t	p
Days of hospitalization	35.13(12.06)	38.29(20.80)	-0.847	0.399
BMI	13.86(1.8)	14.38(1.77)	0.839	0.404
Age, years	23.97(9.1)	25.13(9.75)	0.599	0.551
Duration of illness, years	6.7(7.51)	7.53(10.52)	0.450	0.654
Caloric intake	662.50(345.01)	667.12(348.86)	-0.059	0.953
TCI				
NS	16.69(6.38)	15.61(6.62)	-0.809	0.421
HA	20.94(7.69)	20.76(10.54)	-0.100	0.920
RD	13.27(3.98)	11.84(5.01)	-1.556	0.123
P	4.84(2)	4.47(2.69)	-0.781	0.437
SD	23.28(9.24)	21.45(9.55)	-0.945	0.347
C	29.74(9.27)	25.11(12.42)	-2.103	0.038
ST	11.15(6.62)	9.13(7.32)	-1.407	0.163
EDI-2				
DT	11.89(7.32)	12.95(8.18)	-0.645	0.520
B	2.95(4.23)	3.10(4.63)	-0.166	0.869
BD	15.24(6.39)	14.41(7.75)	0.550	0.584
STAI-State	53.89(14.05)	56.26(14.76)	-0.782	0.436
STAI-Trait	58.42(11.54)	56.97(13.78)	0.539	0.591
BDI	14.95(7.33)	16.49(8.42)	-0.921	0.359
EDE-Q-TOT	3.52(1.70)	3.49(1.69)	0.073	0.942

I-DT: improved drive for thinness; W-DT: worsened drive for thinness; BMI: body mass index; TCI: Temperament and Character Inventory; NS: novelty seeking; HA: harm avoidance: RD: reward dependence: P: persistence; SD: self-directedness; C: cooperativeness: ST: self-transcendence; EDI-2: Eating disorders inventory-2; DT: drive for thinness; B: bulimia; BD: body dissatisfaction; STAI: State Trait Anxiety Inventory; BDI: Beck Depression Inventory; EDE-Q-TOT: Eating Disorders Examination Questionnaire total score

their weight and often motivational interviewing is delivered before hospitalization. Therefore, real-world studies (i.e., including patients who are poorly motivated to seek treatment, suddenly hospitalized) are scarce and needed. In this perspective, our study shows that an urgent hospital intervention lasting around 5 weeks is effective in improving weight, bulimic symptoms, caloric intake and eating symptomatology (i.e., EDE-Q total score). Nevertheless, some psychopathological core aspects, i.e., DT, do not improve in all patients. This finding is in line with previous literature showing similar results in both adults [23] and adolescents [26].

Furthermore, this study illustrates the presence of two groups of patients: I-DT and W-DT, namely those patients whose drive for thinness improves or worsens during hospitalization as their weight stabilizes. These groups are largely comparable to one another on character traits measures, with the exception of cooperativeness, which is greater in those patients whose DT improves at discharge. Within Cloninger's model of personality [35], cooperativeness is a character dimension that can be divided into five sub-dimensions: social acceptance *vs* intolerance (C1); empathy *vs* social disinterest (C2); helpfulness *vs* unhelpfulness (C3); compassion *vs* revengefulness (C4); principles vs. self-advantage (C5). Therefore, cooperativeness is a multifaceted and complex construct with multiple clinical implications. For example, it is relevant in the context of therapeutic alliance, which is centrally embedded in all therapeutic modalities in the clinical management of AN and bears much prognostic salience [42]. Also, it can be crucial in intensive and urgent hospitalizations. In fact, patients with AN tend to refuse treatments and to be hardly engaged in the therapeutic relationship.

Cooperativeness has been linked to dropout as well, which is characteristically elevated in patients with AN, alongside its closely correlated treatment-resistance [12]. Earlier research showed that patients who dropout from psychotherapy report lower self-directedness and cooperativeness compared to patients who complete treatment [43]. Further, findings from our group showed that patients with poor cognitive flexibility report also lower scores on cooperativeness and reward dependence than healthy controls [44]. Finally, cooperativeness is linked to impulsive behaviors, including binge eating, with the mediation of anger in bulimia nervosa [16]. Since AN is characterized by high treatment dropout, and poor outcomes [45], future research should investigate whether cooperativeness is correlated with more positive early life experiences; a crucial factor in determining both the extent to which patients trust their treatment [46], and long-term outcome [45].

Our findings are only in part in line with previous research on severe inpatients with AN. For example, Bennett and collaborators [47] found that patients affected by restrictive type AN (R-AN) reported significantly higher cooperativeness than those with binge/purge type AN (BP-AN). The authors suggested that the R-AN group could be more prone than those with BP-AN to accept treatment in the very acute phase of AN [47]. Although the authors focused on patients with BMI lower than 13, personality traits have been suggested to be independent of BMI scores [19]; therefore, different sample sizes could be responsible for this contrasting finding but further research is needed relating to the personality and prognosis of those patients with AN requiring an emergency hospitalization.

Data on the stability of personality traits are mixed. On one hand, personality traits have been found to be stable after recovery [10 19], while other studies suggest a more state-related fluidity of personality [48]. More specifically, cooperativeness is typically elevated in individuals who recovered from AN, as well as harm avoidance and self-directedness [19]. Although longitudinal research is required to shed light on this issue, our findings provide support to this latter hypothesis, given the association found between higher cooperativeness scores and improvement in core eating psychopathology after hospitalization.

Drive for thinness is a core dimension of AN and a relevant maintaining factor; as a consequence, it would be of clinical interest to find eventual predictor of DT improvement. Recent prospective research found that fear of food could predict DT after an intensive ED treatment [49]. In keeping with data on adult [23] and adolescent inpatients [26], no significant improvement could be found over the course of hospitalization although the vast majority of other clinical parameters did improve. From a psychopathological standpoint, this (non) datum further highlights DT as a key-element of AN.

In closing, some limitations can be acknowledged: participants' severity (i.e., BMI and duration of illness) could jeopardize the generalizability of the results, data are limited to treatment seeking individuals, and no follow-up data are available. Nevertheless, these findings could have clinical implications. In fact, given the association between baseline personality and DT after hospitalization, cooperativeness could help patients being more prone to be engaged in treatment, helping patients overcome those eating-related anxiety and fears that substantially hinder recovery from AN [50]. Also, in keeping with earlier literature [6 13], our findings confirm that personality should be taken carefully into account in defining treatment plans.

Conflict of Interest

The authors have no conflict of interests.

References

1. Klump KL, Bulik CM, Kaye WH, et al. *Academy for eating disorders position paper: eating disorders are serious mental illnesses.* Int J Eat Disord 2009;42:97-103.
2. Stheneur C, Ali A, Tric L, et al. *Impact of somatic severity on long-term mortality in anorex ia nervosa.* Eat Weight Disord 2017;22:285-9.
3. Papadopoulos FC, Ekbom A, Brandt L, et al. *Excess mortality, causes of death and prognostic factors in anorexia nervosa.* Br J Psychiatry 2009;194:10-7.
4. Ulfvebrand S, Birgegård A, Norring C, et al. *Psychiatric comorbidity in women and men with eating disorders results from a large clinical database*. Psychiatry Res 2015;230:294-9.
5. Rotella F, Fioravanti G, Ricca V. *Temperament and personality in eating disorders*. Curr Opin Psychiatry 2016;29:77-83.
6. Lilenfeld LR. *Personality and temperament*. Curr Top Behav Neurosci 2011;6:3-16.
7. Fassino S, Abbate-Daga G, Amianto F, et al. *Temperament and character profile of eating disorders: a controlled study with the temperament and character inventory*. Int J Eat Disord 2002;32:412-25.
8. Jáuregui-Lobera I. *Executive functions in anorexia nervosa*. Nutr Hosp 2014;29:500-7.
9. Kaye WH, Wierenga CE, Bailer UF, et al. *Does a shared neurobiology for foods and drugs of abuse contribute to extremes of food ingestion in anorexia and bulimia nervosa?* Biol Psychiatry 2013;73:836-42.
10. Wagner A, Barbarich-Marsteller NC, Frank GK, et al. *Personality traits after recovery from eating disorders: do subtypes differ?* Int J Eat Disord 2006;39:276-84.
11. Kaye WH, Wierenga CE, Knatz S, et al. *Temperament-based treatment for anorexia nervosa*. Eur Eat Disord Rev 2015;23:12-8.
12. Abbate-Daga G, Amianto F, Delsedime N, et al. *Resistance to treatment and change in anorexia nervosa [corrected]: a clinical overview*. BMC Psychiatry 2013;13:294.
13. Segura-García C, Chiodo D, Sinopoli F, et al. *Temperamental factors predict long-term modifications of eating disorders after treatment*. BMC Psychiatry 2013;13:288.
14. Dalle Grave R, Calugi S, Brambilla F, et al. *The effect of inpatient cognitive-behavioral therapy for eating disorders on temperament and character*. Behav Res Ther 2007;45:1335-44.
15. Amianto F, Spalatro A, Ottone L, et al. *Naturalistic follow-up of subjects affected with anorexia nervosa 8 years after multimodal treatment: Personality and psychopathology changes and predictors of outcome*. Eur Psychiatry 2017;45:198-206.
16. Amianto F, Siccardi S, Abbate-Daga G, et al. *Does anger mediate between personality and eating symptoms in bulimia nervosa?* Psychiatry Res 2012;200:502-12.
17. Guillaume S, Gorwood P, Jollant F, et al. *Impaired decision-making in symptomatic anorexia and bulimia nervosa patients: a meta-analysis*. Psychol Med 2015;45:3377-91.
18. Sheng M, Lu H, Liu P, et al. *Cerebral perfusion differences in women currently with and recovered from anorexia nervosa*. Psychiatry Res 2015;232:175-83.
19. Klump KL, Strober M, Bulik CM, et al. *Personality characteristics of women before and after recovery from an eating disorder.* Psychol Med 2004;34:1407-18.
20. Abbate-Daga G, Facchini F, Marzola E, et al. *Health-related quality of life in adult inpatients affected by anorexia nervosa*. Eur Eat Disord Rev 2014;22:285-91.
21. Elzakkers IF, Danner UN, Hoek HW, et al. *Compulsory treatment in anorexia nervosa: a review*. Int J Eat Disord 2014;47:845-52.
22. Kawai K, Yamashita S, Komaki G, et al. *The outcome of treatment for anorexia nervosa inpatients who required urgent hospitalization*. Biopsychosoc Med 2014;8:20.
23. Schlegl S, Diedrich A, Neumayr C, et al. *inpatient treatment for adolescents with anorexia nervosa: clinical significance and predictors of treatment outcome*. Eur Eat Disord Rev 2016;24:214-22.
24. Chernyak Y, Lowe MR. *Motivations for dieting: drive for thinness is different from drive for objective thinness*. J Abnorm Psychol 2010;119:276-81.
25. Peñas-Lledó E, Bulik CM, Lichtenstein P, et al. *Risk for self-reported anorexia or bulimia nervosa based on drive for thinness and negative affect clusters/dimensions during adolescence: a three-year prospective study of the TChAD cohort*. Int J Eat Disord 2015;48:692-9.
26. Fennig S, Brunstein Klomek A, Shahar B, et al. *Inpatient treatment has no impact on the core thoughts and perceptions in adolescents with anorexia nervosa*. Early Interv Psychiatry 2017;11:200-7.
27. Ramacciotti CE, Dell'Osso L, Paoli RA, et al. *Characteristics of eating disorder patients without a drive for thinness*. Int J Eat Disord 2002;32:206-12.
28. Keski-Rahkonen A, Bulik CM, Neale BM, et al. *Body dissatisfaction and drive for thinness in young adult twins*. Int J Eat Disord 2005;37:188-99.
29. Lavagnino L, Amianto F, Mwangi B, et al. *Identifying neuroanatomical signatures of anorexia nervosa: a multivariate machine learning approach*. Psychol Med 2015;45:2805-12.
30. Kästner D, Gumz A, Osen B, et al. *predictors of Outcome in Inpatients with Anorexia Nervosa: A Prospective Multi-Center Study.* Psychother Psychosom 2015;84:255-7.
31. Goddard E, Hibbs R, Raenker S, et al. *A multi-centre cohort study of short term outcomes of hospital treatment for anorexia nervosa in the UK*. BMC Psychiatry 2013;13:287.
32. Garner DM. *Eating disorder inventory 2: professional manual*. Odessa: Psychological Assessment Resources 1991.
33. American Psychiatric Association. *Diagnostic and statistical manual of mental disorders*, *5th Edition* 2013.
34. National Institute for Health and Clinical Excellence. *Eating disorders: recognition and treatment. NICE guideline (NG69)* 2017.
35. Cloninger CR, Svrakic DM, Przybeck TR. *A psychobiological model of temperament and character*. Arch Gen Psychiatry 1993;50:975-90.
36. Fossati A, Cloninger CR, Villa D, et al. *Reliability and validity of the Italian version of the temperament and character inventory-revised in an outpatient sample*. Compr Psychiatry 2007;48:380-7.
37. Spielberger CD, Gorsuch RL, Lushene R, et al. *Manual for the state-trait anxiety inventory.* Palo Alto: Consulting Psychologists Press 1983.
38. Beck A, Ward C, Mendelson M, et al. *An inventory for measuring depression*. Arch Gen Psychiatry 1961;4:561-71.
39. Fairburn CG, Beglin SJ. *Assessment of eating disorders: interview or self-report questionnaire?* Int J Eat Disord 1994;16:363-70.
40. Arcelus J, Mitchell AJ, Wales J, et al. *Mortality rates in patients with anorexia nervosa and other eating disorders. A meta-analysis of 36 studies*. Arch Gen Psychiatry 2011;68:724-31.
41. Lund BC, Hernandez ER, Yates WR, et al. *Rate of inpatient weight restoration predicts outcome in anorexia nervosa*. Int J Eat Disord 2009;42:301-5.
42. Graves TA, Tabri N, Thompson-Brenner H, et al. *A meta-analysis of the relation between therapeutic alliance and treatment outcome in eating disorders*. Int J Eat Disord 2017;50:323-40.
43. Fassino S, Daga GA, Pierò A, et al. *Dropout from brief psychotherapy in an-*

orexia nervosa. Psychother Psychosom 2002;71:200-6.

44 Abbate-Daga G, Buzzichelli S, Marzola E, et al. *Clinical investigation of set-shifting subtypes in anorexia nervosa*. Psychiatry Res 2014;219:592-7.

45 Castellini G, Lelli L, Ricca V, et al. *Sexuality in eating disorders patients: etiological factors, sexual dysfunction and identity issues. A systematic review*. Horm Mol Biol Clin Investig 2016;25:71-90.

46 Dunn EC, McLaughlin KA, Slopen N, et al. *Developmental timing of child maltreatment and symptoms of depression and suicidal ideation in young adulthood: results from the National Longitudinal Study of Adolescent Health*. Depress Anxiety 2013;30:955-64.

47 Bennett SL, Gaudiani JL, Brinton JT, et al. *Motivated to survive: high cooperativeness in severe anorexia nervosa*. Eat Disord 2015;23:430-8.

48 Kuipers GS, Hollander SD, van der Ark LA, et al. *Recovery from eating disorder 1 year after start of treatment is related to better mentalization and strong reduction of sensitivity to others.* Eat Weight Disord 2017;22:535-47.

49 Levinson CA, Brosof LC, Ma J, et al. *Fear of food prospectively predicts drive for thinness in an eating disorder sample recently discharged from intensive treatment.* Eat Behav 2017;27:45-51.

50 Murray SB, Loeb KL, Le Grange D. *Dissecting the core fear in anorexia nervosa: can we optimize treatment mechanisms?* JAMA Psychiatry 2016;73:891-2.