



Research paper

Affective temperaments and eating psychopathology in anorexia nervosa: Which role for anxious and depressive traits?



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ABSTRACT

Background: Anorexia nervosa (AN) is a severe mental illness. Personality traits and comorbidity with affective and anxiety disorders are key-aspects of its pathogenesis but little attention has been paid so far to affective temperaments in AN. Also, childhood anxiety is proposed to impact on AN clinical severity. Therefore, we aimed to investigate if affective temperaments could be related to AN eating psychopathology also clarifying if those with low versus high scores on depressive and anxious temperaments could differ in AN clinical current and lifetime severity.

Methods: One-hundred and forty-seven inpatients with AN were consecutively recruited. All participants completed: Temperament Evaluation of Memphis, Pisa, Paris and San Diego-Autoquestionnaire, Eating Disorder Examination Questionnaire, State Trait Anxiety Inventory, Beck Depression Inventory. Clinical data were collected upon admission.

Results: Regression models showed that all affective temperaments were associated with eating psychopathology (eating restraint and eating, shape, and weight concerns); however, when controlling for confounders, only the anxious temperament remained significant. Also, those patients with higher scores on depressive and anxious temperaments reported higher current and lowest lifetime body mass index (BMI).

Limitations: Only inpatients were recruited; self-report assessments were used and follow-up data are lacking.

Conclusions: Results from this study support the association between affective (anxious in particular) temperament traits and the presence of altered eating psychopathology in AN. Also, higher traits of depressive and anxious temperaments reported higher current and lowest lifetime BMI. Should these findings be confirmed, the assessment of the anxious temperament could fruitfully inform prevention and treatment interventions for AN.

1. Introduction

Anorexia nervosa (AN) is a severe mental illness characterized by relentless pursuit of thinness, aberrant patterns of eating behaviors, body image disturbances, frenetic exercise, fear of being “fat” in spite of severe emaciation (American Psychiatric Association, (APA), 2013). It is a severe disorder, fraught with life-threatening organic consequences, elevated mortality (Arcelus et al., 2011; Fichter and Quadflieg, 2016) coupled with high suicidality (Thornton et al., 2016). Currently, outcomes are at best unsatisfactory also because the etiopathogenesis of AN is still largely elusive.

Personality traits are a key aspect of AN pathogenesis, with data supporting their relevance in both development and maintenance of AN (Atiye et al., 2015a; Treasure et al., 2015). In fact, recent studies showed that patients with AN tend to have specific temperament traits

(e.g., harm avoidance, negative emotionality, rigidity, perfectionism (Dahlenburg et al., 2019; Fassino et al., 2002, 2004; Rotella et al., 2016) which are highly implicated in the development and maintenance of AN (Kaye et al., 2009; Wierenga et al., 2014). Prompted by these lines of research, personality is currently considered a risk factor for AN (Lilenfeld, 2011) as well as an outcome predictor (Segura-García et al., 2013). The biopsychosocial perspective (Cloninger et al., 1993) has been largely used in the field of eating disorders with amassing evidence showing that patients with AN report marked harm avoidance with a sort of gradient across subtypes of eating disorders (Atiye et al., 2015b; Fassino et al., 2002, 2004).

In contrast, little attention has been paid so far to affective temperaments in AN (Marzola et al., 2017; Ramacciotti et al., 2004). According to Akiskal's model, affective temperaments (i.e., dysthymic/depressive, hyperthymic, cyclothymic, irritable, anxious) refer to sub-

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affective trait expressions as they were conceptualized in Ancient Greek psychological medicine and subsequently by the Nineteenth Century German psychiatry (Akiskal and Akiskal, 2007; Rihmer et al., 2010). They reflect clinically observable, biologically-based predispositions toward certain patterns of emotions, cognitions and behaviors, similar to the concept of endophenotypes (Macdonald et al., 2013; Panksepp, 2006). A growing body of evidence shows that affective temperaments are heritable (Gonda et al., 2009; Lin et al., 2010) and sub-threshold forms of clinical conditions, with the association between anxious temperament and serotonin transporter gene (Gonda, 2008) and depressive and oxytocin polymorphisms (Kawamura et al., 2010) further supporting this notion.

Earlier work from our group (Marzola et al., 2017) focused on affective temperaments in AN, finding an association between depressive and anxiety traits and full-blown comorbidities. This is in line with anxiety research showing that the anxious temperament is a putative predictor for future panic disorders (Perna et al., 2012). Also, anxiety has a key role in AN because of multiple reasons: clinical and epidemiological research consistently showed that anxiety disorders are frequently comorbid with AN (Godart et al., 2002; Hudson et al., 2007; Kendler et al., 1995; Swinbourne et al., 2012; Walters and Kendler, 1995) with upper estimates reaching 80% (Godart et al., 2002). Furthermore, psychiatric comorbidity is thought to influence prognosis (Zerwas et al., 2013) and in the majority of cases the onset of anxiety disorders precedes AN (Bulik et al., 1997; Deep et al., 1995; Godart et al., 2000). Relatedly, heightened anxiety is maintained even after recovery from AN (Kezelman et al., 2015; Lilenfeld et al., 1998) thus suggesting an underlying anxious trait that is at least partially independent of nutrition. Also, research investigating premorbid anxiety ascertained that premorbid anxiety symptoms are related to a more severe presentation of AN (Dellava et al., 2010).

Major depressive disorder is one of the most common comorbid disorders with AN (Abbate-Daga et al., 2011; Godart et al., 2007) potentially influencing also patients' neurocognitive performances (Abbate-Daga, 2015). Even more than for anxiety, the debate is open as to whether depression could be a predisposing factor versus a consequence of AN-related severe malnutrition (Mattar et al., 2011). The relevance of a depressive trait in AN is grounded on literature showing depression as a key element in AN (Monteleone et al., 2019; Solmi et al., 2019). Also, the onset of depression tend to precede AN (Deep et al., 1995) and unrecovered women report more often to have suffered from major depression before developing AN, even after controlling for duration of illness (Keski-Rahkonen et al., 2014). Consistently, major depression in AN has been reported not to be responsive to antidepressant treatments (Mischoulon et al., 2011) and full recovery from ED was associated with greater likelihood of depression relapse (Mischoulon et al., 2011). Finally, anxious and depressive symptoms are so interwoven with body image difficulties, core aspects of AN, that tend to change over time during the course of illness (Junne et al., 2016).

Prompted by the aforementioned gaps in literature on the relationship between AN and anxiety and depressive symptoms we became interested in investigating if, and to what extent, affective temperaments (i.e., inheritable and stable personality traits) could be related with eating psychopathology with a focus on depressive and anxious traits. Moreover, we aimed to ascertain as to whether those with low versus high scores on depressive and anxious temperaments could differ in AN severity. We expected to find an association between both anxious and depressive temperaments with eating psychopathology and to provide support to the association between higher affective traits of depression and anxiety and AN severity.

2. Methods

2.1. Participants

One-hundred and sixty-three female inpatients voluntarily and consecutively admitted to the ward of the Eating Disorders Center of the “Città della Salute e della Scienza” hospital of Turin, University of Turin, Italy, were initially included in this study. However, five individuals refused to participate in this study, four did not provide a complete assessment and seven did not meet inclusion criteria; therefore, the final sample was composed by 147 inpatients with AN. Socio-demographical and clinical information was collected on the first day of hospital stay. Patients were included if meeting the following criteria: a) full diagnosis of AN as assessed with the Structured Clinical Interview for DSM-5 (First et al., 2016) by an experienced psychiatrist upon admission; b) no substance dependence; c) no psychotic –spectrum disorders; d) no organic comorbidities (e.g., diabetes) or emaciation-driven cognitive alterations as clinically assessed by an experienced psychiatrist.

Participants' height and weight were measured by a trained nurse in order to calculate their body mass index (BMI) upon admission. Patients' lowest BMI was investigated during clinical interview.

The Ethical Committee of the Department of Neuroscience of the University of Turin, Italy, approved this study and all patients provided their written informed consent.

2.2. Measures

All participants completed the following assessments:

2.2.1. Temperament Evaluation of Memphis, Pisa, Paris and San Diego Autoquestionnaire (TEMPS-A)

The theory of affective temperaments comes from the Ancient Greek medicine and was retrieved by Nineteenth Century German psychiatry (Akiskal and Akiskal, 2007; Kraepelin, 1921).

The TEMPS-Autoquestionnaire is a 110-item (109-item for men) self-administered, Yes-or-No type questionnaire that allows to measure affective temperamental traits. It assesses dysthymic (items 1–22), cyclothymic (items 23–42), hyperthymic (items 43–63), irritable (items 64–84) and anxious (item 85–110) temperaments. In this study, we used the validated Italian version of TEMPS-A (Pompili et al., 2008).

2.2.2. Eating Disorder Examination Questionnaire (EDE-Q)

EDE-Q (Fairburn and Beglin, 1994) is a self-administered questionnaire, validated and with strong retest variability, designed to assess eating psychopathology over the past 28-days. It measures the severity of four different eating disorder symptoms (Restraint, Eating Concern, Shape Concern and Weight Concern) giving also a global score. In this study we used the EDE-Q Italian language version, composed by 28-items (Calugi et al., 2017).

2.2.3. State Trait Anxiety Inventory (STAI)

The STAI (Spielberger et al., 1983) is a widely used, validated psychometric instrument, that allows to distinguish between two different dimensions of anxiety: the state anxiety (S-anxiety), a transitory state, and trait anxiety (T-anxiety), a stable individual disposition. These two types of anxiety are measured by two different, 20-items, self-report scales (Form X for the S-anxiety and Form Y for the T-anxiety). For each item the severity of anxious symptoms is rated from 1 (not at all/almost never) to 4 (very much so/almost always) and a global score from 20 to 80 is assessed.

2.2.4. Beck Depression Inventory (BDI)

The BDI (Beck et al., 1961) is a well validated instrument used to assess depressive symptomatology severity. It's composed by 13-items, defining a scale ranging from minimal (scores from 0 to 4) depressive

symptoms to severe depression (scores from 16 to 39). Mild (scores from 5 to 7) and moderate (scores from 8 to 15) score are also available.

2.3. Statistical analysis

The Statistical Package for Social Sciences 25.0 (IBM Corp, 2017) was used to run the analyses. A two-tailed alpha level of 0.05 was set.

Univariate linear regressions were performed in order to investigate the association between affective temperaments and eating psychopathology; as a second step, a multivariate regression analysis controlling for multiple variables (i.e., age, duration of illness, current BMI, severity of anxiety and depressive symptomatology) has been run in order to ascertain the association between affective temperaments (independent variable) and eating psychopathology (dependent variable).

Percentiles have been calculated for all affective temperaments in order to discriminate those patients with high ($\geq 50^\circ$ percentile) versus low ($< 50^\circ$ percentile) scores of affective temperament. Subsequently, Students' *t*-test has been performed to verify as to whether those with low versus high anxious and depressive temperament scores differ with respect to current and lowest lifetime BMI.

3. Results

3.1. Clinical characteristics of the sample

The final sample was composed by 147 patients with AN: 102 were affected by the restricting subtype of AN (R-AN, 69.4%) and 45 by the binge-purging subtype of AN (30.6%). Concerning the BP-AN group, weekly binges were 7.3 ± 12.1 ; moreover, 81% of the sample self-induced vomit, while 35% adopted laxative and 8.1% diuretics misuse as purging behaviors. Mean age was 24.3 ± 9.3 years, mean duration of illness was 6.4 ± 8 years [range: 0.25–40 years], and mean BMI was 14.2 ± 1.7 . Ten patients (6.8%) were males. Mean lowest BMI was 13.4 ± 1.6 and about 43% of participants were currently at their lowest BMI. Mean scores of eating and general psychopathology at admission were: EDE-Q total score: 3.4 ± 1.7 ; BDI: 15.8 ± 8 ; STAI-S: 54.3 ± 14.3 ; STAI-T: 57.2 ± 13.1 . Patients with R-AN and BP-AN showed comparable age but significantly differed on BMI (R-AN: 13.9 ± 1.6 ; BP-AN: 15 ± 1.6 ; $t = 3.53$; $p = 0.001$), duration of illness (R-AN: 5.4 ± 7.2 ; BP-AN: 9.3 ± 9.8 ; $t = 2.57$; $p = 0.011$), and lowest BMI (R-AN: 13.4 ± 1.5 ; BP-AN: 14.8 ± 2 ; $t = 2.74$; $p = 0.008$). A comorbid depressive disorder was found in 56.7% of the sample and an anxiety disorder could be diagnosed in the 63.4% of patients.

3.1.1. Associations between affective temperaments and eating psychopathology

Linear regression analyses showed an association between all affective temperaments and eating psychopathology, as measured by the total score of the EDE-Q. Fig. 1 reports the uncorrected model of association between eating psychopathology and anxious temperament. When a multivariate model was run, only the anxious temperament resulted associated with the EDE-Q total score (see Table 1).

Concerning the restraint subscale of the EDE-Q, all affective temperaments but the hyperthymic one were found to be significantly associated; however, when a multivariate model was run, only the anxious temperament resulted associated with this subscale (see Table 2).

Eating concern, another subscale of the EDE-Q, resulted significantly associated with all affective temperaments but when a multivariate model was run only the anxious temperament resulted associated with this subscale (see Table 3).

In line with the aforementioned results, also the shape concern subscale of the EDE-Q showed an association with all affective temperaments but, after correction for potential confounders (i.e., age, duration of illness, current BMI, severity of anxiety and depressive

symptomatology), only the anxious temperament held significance (see Table 4).

According to the linear regression model, all affective temperaments were significantly associated with the weight concern subscale of the EDE-Q; however, when a multivariate model was run, only the anxious temperament resulted associated with this subscale (see Table 5).

3.1.2. Differences in clinical presentation according to high versus low temperament scores

When the groups of high versus low temperament scores were compared, those with higher versus lower scores on temperament traits of depression (i.e., the dysthymic temperament) and anxiety (i.e., the anxious temperament) reported significantly higher lowest lifetime BMI (low depressive temperament [$n = 80$]: 13.1 ± 1.4 versus high depressive temperament [$n = 67$]: 13.8 ± 1.8 , $t = 2.716$; $p = 0.007$; low anxious temperament [$n = 76$]: 13 ± 1.4 versus high anxious temperament [$n = 71$]: 13.8 ± 1.7 ; $t = 3.128$; $p = 0.002$) and current BMI (low depressive temperament [$n = 80$]: 13.7 ± 1.5 versus high depressive temperament [$n = 67$]: 14.8 ± 1.8 , $t = 3.828$; $p < 0.001$; low anxious temperament [$n = 76$]: 13.8 ± 1.6 versus high anxious temperament [$n = 71$]: 14.7 ± 1.6 ; $t = 3.417$; $p = 0.001$).

4. Discussion

Results from this study support the association between affective, anxious in particular, temperament traits and the presence of altered eating psychopathology in AN, including eating restraint and eating, shape, and weight concerns. Also, those patients with higher traits of depressive and anxious temperaments reported higher current and lowest lifetime BMI. These are overall novel findings and could provide new insights into the relationship between traits of anxiety and depression and the severity of core symptoms of AN. In fact, although the relationship between depression, anxiety and AN is intertwined (Abbate-Daga et al., 2011; Kaye et al., 2004; Klump et al., 2004; Marzola et al., 2017), scant attention has been paid so far to the investigation of the impact of the temperament traits on the psychopathology of AN.

Our a priori hypothesis was only partially confirmed; in fact, when controlling for confounders (i.e., age, duration of illness, current BMI, severity of anxiety and depressive symptomatology), only the anxious temperament remained significantly associated to the eating psychopathology of AN. However, this datum is of interest since it catalyzes research attention specifically to the temperament traits of anxiety as a key element of vulnerability. In fact, the anxious temperament can be described as a phenotype of increased psychological and behavioral activity to a whole variety of stimuli that has been shaped during early childhood (Fox et al., 2008; Schwartz et al., 2003).

According to the linear model, all affective temperaments were correlated to AN but after controlling for age, duration of illness, current BMI, baseline severity of depressive and anxious symptomatology only the anxious trait held significance. In fact, low weight, chronicity or depressive and anxious symptoms have been shown to have a role in this regard; for example, the impact of depressive temperament on AN psychopathology resulted to be mostly influenced by the presence of depression and demoralization after a long duration of illness, consistently with literature (Blinder et al., 2006; Calugi et al., 2014). In contrast, the anxious temperament was found to be independent of the aforementioned factors and more selectively linked to AN symptoms.

As stated earlier, the biopsychosocial perspective (Cloninger et al., 1993) has been consistently used so far to study eating disorders; however, affective temperaments allow to deepen more the relationship between personality traits and eating psychopathology. In fact, the dimension of harm avoidance (Cloninger et al., 1993) – accumulated lot of evidence on its role in the development and maintenance of AN (Atiye et al., 2015; Lilienfeld, 2011). Notwithstanding, harm avoidance represents a broad dimension which fits well with data from

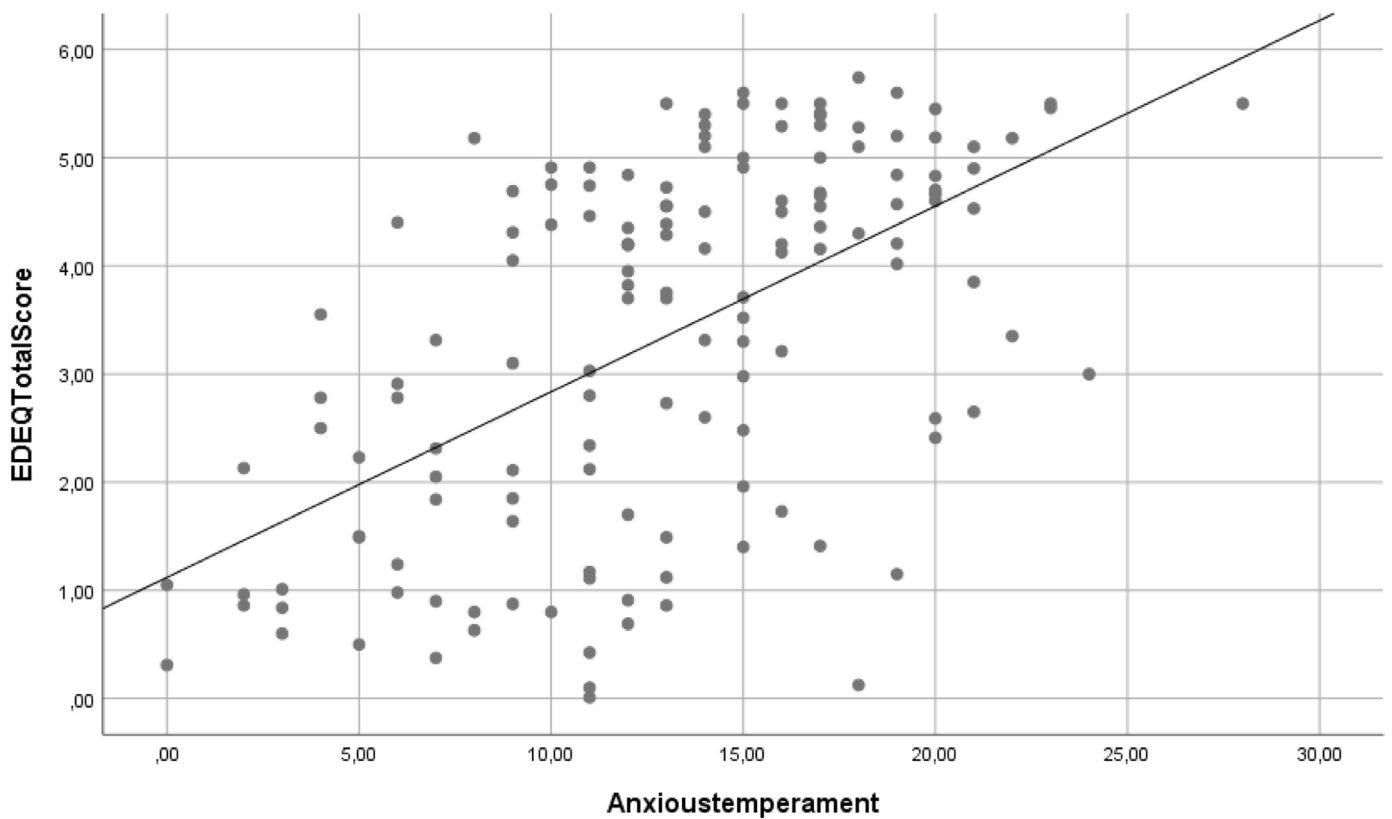


Fig. 1. Scatterplot of the association between the anxious temperament and eating psychopathology, as measured by the Eating Disorders- Examination – Questionnaire total score (uncorrected model).

neurobiology of eating disorders (Kaye et al., 2009) but tends to be less determinant on a clinical basis. In this view, affective temperaments can be more fine-grained in order to disentangle the distinction between anxious and depressive traits.

The specific relationship with anxious traits is in line with some theoretical models on the AN pathogenesis proposing a key role for premorbid anxious traits (Kaye et al., 2004; Klump et al., 2004; Lloyd et al., 2019; Monteleone et al., 2018; Wierenga et al., 2014) grounded on robust studies conducted on the frequent comorbidity of anxiety disorders and AN (Pallister and Waller, 2008; Swinbourne et al., 2012) and the maintenance of heightened anxiety even after recovery from AN (Kezelman et al., 2015; Lilienfeld et al., 1998). Furthermore, these results are interesting from a reward standpoint as well. In fact, patients with AN tend to be anhedonic and ascetic with studies on the neurobiology of AN thus proposing a role for anxious vulnerability in AN (Bailer et al., 2017). In this light, literature already showed heightened anxiety (instead of the expected euphoria) in individuals recovered from AN after the administration of amphetamines (Bailer et al., 2013). Finally, twin studies garnered data on a shared

genetic transmission between eating disorders and anxiety disorders (Keel et al., 2005; Silberg and Bulik, 2005). Although the debate on both overlap and possible causal relationships between AN and anxiety remains open (Lloyd et al., 2019; Pallister and Waller, 2008), our findings are consistent with literature proposing a relevant impact of anxiety on the development of AN.

Additionally, our findings mirror other fields of psychiatry, since so far research showed the anxious temperament as increasing risk for anxiety disorders, depression and comorbid substance use disorders (Altinbas et al., 2013; Oler et al., 2010). As a result, it could be assumed that temperament risk factors go beyond diagnostic categories, as recently proposed (Monteleone et al., 2019). Regardless, any firm conclusions cannot be drawn on the time relationship between temperament and AN since a longitudinal design has not been adopted here. In fact, given the cross-sectional nature of this study the role of environmental factors cannot be ruled out. However, since affective temperaments are biologically-driven and genetically determined (Gonda et al., 2009) it could be proposed that the anxious temperament might have a role in the complex vulnerability cascade triggering the development of

Table 1
Association of affective temperaments and EDE-Q total score.

Factor	AN sample n = 147									
	Univariate analysis					Multivariate analysis ^a				
	R/Adj R ²	F	B(95%CI)	β	p	R/Adj R ²	F	B (95%CI)	β	p
Depressive	.482/0.227	43.33	(0.14–0.26)	.48	<0.001	.669/0.453	15.39	.04(–0.03–0.12)	.10	.269
Cyclothymic	.503/0.247	48.36	(0.13–0.23)	.5	<0.001	.676/0.427	15.99	.54(–0.01–0.11)	.15	.062
Hyperthymic	.227/0.045	7.74	(–0.15–0.03)	–0.23	.006	.666/0.414	15.21	.21(–0.35–0.08)	.06	.464
Irritable	.457/0.203	37.66	(0.14–0.27)	.46	<0.001	.665/0.412	15.11	.01(–0.06–0.9)	.03	.710
Anxious	.562/0.311	66.15	(0.13–0.21)	.56	<0.001	.688/0.445	17.12	.07(0.02–0.12)	.24	.006

^a multivariate model included age, duration of illness, body mass index, baseline depression and anxiety scores

Table 2
Association of affective temperaments and restraint, as measured by the EDE-Q.

Factor	AN sample <i>n</i> = 147									
	Univariate analysis					Multivariate analysis ^a				
	R/Adj R ²	F	B(95%CI)	β	p	R/Adj R ²	F	B (95%CI)	β	p
Depressive	.444/0.191	35.07	.22(0.15–0.30)	.44	< 0.001	.606/0.333	10.69	.04(–0.05–0.14)	.08	.383
Cyclothymic	.455/0.201	37.29	.19(0.13–0.26)	.45	< 0.001	.614/0.343	11.13	.06(–0.01–0.13)	.14	.101
Hyperthymic	.142/0.013	2.93	–0.07(–0.14–0.01)	–0.14	.089	.613/0.342	11.10	.06(–0.01–0.13)	.12	.110
Irritable	.445/0.193	35.35	.24(0.16–0.31)	.44	< 0.001	.607/0.334	10.75	.05(–0.05–0.15)	.09	.318
Anxious	.500/0.245	47.65	.18(0.13–0.24)	.5	< 0.001	.623/0.355	11.67	.08(0.01–0.14)	.21	.025

^a multivariate model included age, duration of illness, body mass index, baseline depression and anxiety scores

AN.

Strikingly, our findings on the relationship between temperament traits of anxiety and BMI are not in line with earlier literature reporting anxiety in childhood as associated with low BMI in AN (Dellava et al., 2010) since we found the opposite result. However, our findings are not directly comparable to earlier literature because of three main reasons: first, Dellava and coworkers measured childhood temperament of affected individuals asking their mothers to retrospectively evaluate it; second, BMI was calculated from self-report data (while 43% of the sample was currently at the lowest BMI); third, a formal diagnosis was used while we referred to temperament traits. However, such contrasting findings raise the possibility that the anxious temperament could explain AN active psychopathology rather than BMI which is an unrefined proxy for clinical severity. Also, recent literature (Monteleone et al., 2019) found AN as characterized by a broad psychopathological spectrum thus highlighting a re-conceptualization of this disorder. Notwithstanding, only future studies could clarify the relationship between anxiety traits and BMI.

No FDA-approved medications exist for AN; notwithstanding, research showed olanzapine (Bissada et al., 2008; Brambilla et al., 2014) and aripiprazole (Marzola et al., 2015), but not benzodiazepines (Fitzpatrick and Lock, 2011) as effective for some patients. It could be raised the hypothesis that these drugs could be effective in reducing patients' pursuit of starvation and over-exercise operating on their anxious vulnerability, but only future studies could provide support to this intriguing possibility. Relatedly, assessing temperament in AN could have also other noteworthy clinical implications. In fact, in keeping with the literature on mood disorders (De Aguiar Ferreira et al., 2014) different responses to treatment and different trajectories over the long-run could be potentially related to patients' affective temperaments. Also, it has been shown how the anxious temperament could impact on suicide (Tanabe et al., 2016) and this could be of interest in AN as well, since about 50% of adult patients mention suicidal ideation, and up to 26% of patients attempted suicide (Bulik et al., 2008; Forcano et al., 2011).

In closing, our findings support the role of the anxious temperament concerning psychopathology core aspects of AN, namely eating

restraint and eating, shape, and weight concerns. In spite of several strengths, this paper suffers from some limitations as well: our data rely on inpatients, so these findings could not be generalizable to all affected individuals. Furthermore, we adopted self-report assessments and follow-up data, potentially useful in the clarification of the role of anxiety in AN recovery, are lacking. Theoretically, only longitudinal studies could shed light on this association; however, it has been already claimed the need for retrospective assessments for rare conditions as AN (Serpell et al., 2002). Should these findings be confirmed, the assessment of the anxious temperament could fruitfully inform prevention and treatment interventions for AN.

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CRediT authorship contribution statement

Enrica Marzola: Data curation, Formal analysis, Writing - original draft, Writing - review & editing. **Alain Porliod:** Data curation, Formal analysis, Writing - review & editing. **Matteo Panero:** Data curation, Writing - review & editing. **Carlotta De-Bacco:** Writing - review & editing. **Giovanni Abbate-Daga:** Data curation, Formal analysis, Writing - review & editing, Conceptualization.

Declaration of Competing Interest

The authors have no conflicts of interest to declare.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.jad.2020.01.142](https://doi.org/10.1016/j.jad.2020.01.142).

Table 3
Association of affective temperaments and eating concern, as measured by the EDE-Q.

Factor	AN sample <i>n</i> = 147									
	Univariate analysis					Multivariate analysis ^a				
	R/Adj R ²	F	B(95%CI)	β	p	R/Adj R ²	F	B (95%CI)	β	p
Depressive	.441/0.189	34.59	.18(0.12–0.25)	.44	< 0.001	.631/0.365	12.17	.03(0.05–0.10)	.07	.481
Cyclothymic	.459/0.206	38.25	.16(0.11–0.21)	.46	< 0.001	.636/0.372	12.49	.04(–0.02–0.1)	.11	.175
Hyperthymic	.300/0.084	14.18	–0.12(–0.18–0.06)	–0.3	< 0.001	.630/0.364	12.12	–0.02(–0.07–0.04)	–0.04	.593
Irritable	.414/0.166	29.60	.18(0.12–0.25)	.41	< 0.001	.629/0.363	12.05	.01(–0.08–0.08)	.00	.992
Anxious	.516/0.261	51.86	.16(0.11–0.2)	.52	< 0.001	.645/0.384	13.1	.06(0.01–0.11)	.19	.037

^a multivariate model included age, duration of illness, body mass index, baseline depression and anxiety scores

Table 4
Association of affective temperaments and shape concern, as measured by the EDE-Q.

Factor	AN sample n = 147									
	Univariate analysis					Multivariate analysis ^a				
	R/Adj R ²	F	B(95%CI)	β	p	R/Adj R ²	F	B (95%CI)	β	p
Depressive	.429/0.178	32.17	.19(0.12–0.26)	.43	<0.001	.600/0.325	10.37	.05(−0.04–0.13)	.1	.279
Cyclothymic	.413/0.165	29.45	.15(0.1–0.21)	.41	<0.001	.600/0.325	10.34	.03(−0.03–0.1)	.09	.309
Hyperthymic	.213/0.039	6.78	−0.09(−0.15–0.02)	−0.21	.010	.596/0.320	10.13	.01(−0.06–0.07)	.02	.789
Irritable	.390/0.146	25.62	.18(0.11–0.25)	.39	<0.001	.595/0.319	10.11	−0.01(−0.09–0.08)	−0.01	.920
Anxious	.490/0.234	45.09	.16(0.11–0.20)	.49	<0.001	.613/0.341	11.07	.06(0.01–0.12)	.19	.039

^a multivariate model included age, duration of illness, body mass index, baseline depression and anxiety scores

Table 5
Association of affective temperaments and weight concern, as measured by the EDE-Q.

Factor	AN sample n = 147									
	Univariate analysis					Multivariate analysis ^a				
	R/Adj R ²	F	B(95%CI)	β	p	R/Adj R ²	F	B (95%CI)	β	p
Depressive	.463/0.209	39.04	.21(0.15–0.28)	.46	<0.001	.648/0.389	13.37	.05(−0.03–0.14)	.12	.210
Cyclothymic	.455/0.201	37.24	.18(0.12–0.23)	.45	<0.001	.647/0.388	13.3	.04(−0.03–0.1)	.1	.252
Hyperthymic	.232/0.047	8.15	−0.1(−0.17–0.03)	−0.23	.005	.644/0.383	13.05	.02(−0.05–0.08)	.04	.600
Irritable	.422/0.172	30.91	.2(0.13–0.28)	.42	<0.001	.643/0.381	12.98	.01(−0.08–0.09)	.01	.915
Anxious	.542/0.289	59.41	.18(0.13–0.23)	.54	<0.001	.668/0.416	14.83	.08(0.02–0.14)	.24	.007

^a multivariate model included age, duration of illness, body mass index, baseline depression and anxiety scores

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