

PERSONALITY TRAITS BETWEEN PARENT-ADOLESCENT INTERACTION IN ANOREXIA NERVOSA AT ONSET: CONTROL-CASE STUDY

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Abstract

The aim of the study was to examine the relationship between personality traits of parents and their daughters with anorexia nervosa (AN) by a case-control study. Fifty adolescent girls with AN (G-AN) and 50 control girls without pathology (GC) were measured with the “Junior Temperament and Character Inventory” and the “Eating Disorder Inventory-2”, and both parents. The G-AN and the CG did not differ in personality traits. Both parents of G-AN showed significant differences in temperamental and character traits compared to both parents in CG. In the G-AN, complementary relationships were found in mothers’ harm avoidance daughters cooperativeness and fantasy, while in fathers and daughters associations between reward dependence, persistence and self-directedness were found. The only scale that discriminated between the two groups was drive for thinness for G-AN and CG (classification: 74.7%). Identifying personality traits of parents and their daughters at the onset of AN will allow improvements in the intervention.

KEY WORDS: *personality, adolescent, parents, anorexia nervosa.*

Resumen

El objetivo del estudio fue examinar la relación entre los rasgos de personalidad de los padres y sus hijas con anorexia nerviosa (AN) mediante un estudio de casos y controles. Fueron evaluadas 50 chicas adolescentes con AN (G-AN) y 50 chicas sanas (GC) con el “Inventario de temperamento y carácter para Adolescentes” y el “Inventario de trastornos de la conducta alimentaria-2”, junto a sus padres. El G-AN y

This work was supported by the Spanish Ministry of Science and Innovation (RYC-2009-05,092 and PSI2011-23,127); and the Education Ministry of Spain (FPU15/05,783).

We express our gratitude to all the families, staff hospital and psychiatrists from the mental health centers who helped us in the recruitment process, mainly to E. Mollejo from Sureste Hospital, Mental Health Service. As well very grateful to the headmasters and teachers from this three Secondary Schools: I.E.S. La Estrella, I.E.S. Las Musas, I.E.S. Alameda de Osuna, that facilitated us the recruitment stage. We would like to express my gratitude mainly to T. Alvarez, L. Gonzalez and C. Bustos, as other psychologist collaborators. Currently, D. A. works at Autonomous University of Barcelona.

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el GC no difirieron en los rasgos de personalidad. Los padres del G-AN mostraron diferencias significativas en los rasgos temperamentales y de carácter en comparación con los padres del GC. Se encontraron relaciones complementarias en la evitación del daño de las madres con la cooperación y la fantasía de las hijas en el G-AN, mientras que en los padres y las hijas se encontraron asociaciones entre la dependencia de la recompensa, la persistencia y la autodirección. La única escala que discriminó entre el G-AN y GC fue la obsesión por la delgadez (clasificación: 74,7%). La identificación de los rasgos de personalidad de padres y adolescentes al inicio de la AN permitirá mejorar la intervención.

PALABRAS CLAVE: *personalidad, adolescentes, padres, anorexia nerviosa.*

Introduction

Eating disorders (EDs) are considered as serious pathologies with a multifactorial aetiology, in which personal vulnerability (including genetic and psychological factors), socio-cultural, interpersonal, and family factors are involved (Striegel-Moore & Bulik, 2007; Treasure et al., 2010).

Therefore, research has been focused on trying to identify the factors that can be associated with the origin and maintenance of the pathology. In this regard, several studies have shown that personality is a factor involved in the genesis of an ED and in the specific symptomatology associated with the pathology, and it also influences the treatment outcome (Amianto et al., 2011, 2017; Bruce & Steiger, 2004; Westen & Harnden-Fischer, 2001). In fact, personality characteristics may better predict risk and maintenance factors associated with the pathology as well as treatment outcomes than specific ED diagnoses (Wagner et al., 2019). Indeed, a meta-analysis by Cassin and Von Ranson (2005) identified personality traits such as perfectionism, impulsiveness, obsessiveness, sensation seeking, narcissism and self-directedness to be associated with the development of ED.

Research on personality traits associated with EDs has commonly been based on the model of the five-factor theory of personality, *the Big Five* (McCrae & Costa Jr., 1990). This model proposes that personality reflects the pattern of thoughts, feelings, and actions that are relatively stable over time and across situations. These authors conceptualized five dimensions that include neuroticism, extraversion, openness, agreeableness, and conscientiousness. However, Cloninger's (1986) model has arguably become one of the most important psychobiological models applied in this field. This model is divided into two domains: temperament, partially inherited and defined since childhood, which in turn is made up of four dimensions (Novelty Seeking, NS; Harm Avoidance, HA; Reward Dependence, RD; and Persistence, P) and character, which is developed through life experiences and composed of three dimensions (Self-Directedness, SD; Cooperativeness, CO; and Self-Transcendence, ST). Cloninger's model proposed a dimensional approach to personality evaluation (Komasi et al., 2022) presenting normal and abnormal personality traits associated with psychopathology as two ends of the same continuum (López Villalobos et al., 2022; Walton et al., 2008).

Following Cloninger's model of personality (1993) and based on numerous studies that establish associations between personality patterns and ED psychopathology (Cloninger et al., 1993; Davico et al., 2019; Farstad et al., 2016; Fassino et al., 2004), it is expected that, on one hand, the environment in which the person develops, and the personality traits of his/her parents share a relationship with the personality of the adolescent. On the other hand, these traits may be related with the ED psychopathology. For instance, obsessiveness in a parent constitutes a risk factor (Lilenfeld et al., 1998), while perfectionism has been studied especially in mothers, and authors typically refer to the role of the parents as a major determinant in the development of perfectionism in daughters (Johnston et al., 2018). Parents model how children should behave and react to the world around them. Under ideal conditions, parents provide their children with all the tools they require to successfully develop in all aspects mentally/emotionally, physically, and socially. Several attempts have been made to describe such interactions to learn if there is a transgenerational transmission of perfectionism and how it expresses itself in terms of family dynamics (Santos et al., 2018).

Since 2000, Fassino and colleagues have been studying parental personalities and their relevant contribution to the development of EDs in daughters. For instance, Fassino et al. (2002) analysed the relationship of personality traits in 50 patients with Restrictive Anorexia Nervosa (AN-R) and the personality of their parents using the Cloninger's Temperament and Character Inventory (Cloninger et al., 1993). These patients presented the "*Triad of Anorexia*": high *harm avoidance* (HA), low *novelty seeking* (NS), high *persistence* (P), and low *self-directness* (SD) as the common traits. In mothers, low SD was also found compared to no pathology controls. In fathers, they showed high HA, high RD, and a low level of P. High HA predisposes to depressive, anxious, and stress reactions to harmful stimuli. Thus, it is possible that these depressed or anxious fathers impose relational stressors on their daughters that may contribute to the development of an AN-R before any other subtype. RD is a tendency to respond intensely to signals of reward leading the subject to maintain or resist the extinction of behaviour that has previously been related to rewards or relief from punishment (Atiye et al., 2015). Low persistence was the most common personality trait among the fathers of different eating-disordered groups and this temperament style may promote instability in the father-daughter relationship through inconsistent support and discipline before and after the onset of an ED (Fassino et al., 2009).

However, scientific literature has shown that personality-based family dynamics seem to differ greatly from one family to another (Amianto et al., 2013). In mothers of girls and women with AN, two temperament clusters have been found: (1) the explosive/adventurous cluster (high NS, low HA, low RD and a medium P), which is described as more skilled with a lower level of psychopathology and a greater resistance to discouragement derived from the disorders of their daughters; and (2) the cautious/passive-dependent cluster (low NS, high HA, high RD, and high P), which is characterized by an inhibition in the pursuit of pleasure, worry, and pessimism, which could lead to a high genetic disposition in their daughters towards high harm avoidance,

the development of a more anxious/depressive profile (Mazzeo & Bulik, 2009). In the case of fathers, two temperament clusters have been found: (1) the methodical explosive (high NS, high HA, high RD, and a low P), which is characterized by immaturity, frustration, intolerance, and instability and is accompanied by an increased likelihood of having outbursts of anger, greater need for approval, and poor behavioral control; and (2) the methodical independent (low HA, low NS, low RD, and high P) that shows a high level of ambition and demand as well as high expectations of their daughters. These results regarding the prototypical profiles of the parents of patients with ED represent a progress in the understanding of the complexity of the dynamics that are generated in the family and their influence on the genesis of EDs.

Several scientific advances reveal a neurobiologically based AN temperament with altered interoceptive awareness, reward insensitivity, anxiety, and cognitive inflexibility (Kaye et al., 2015). Some treatments addressed to EDs, based on temperament and neurobiology, have shown ways to help individuals to develop constructive, rather than destructive, ways to manage their temperament (Kaye et al., 2015; Knatz Peck et al., 2021).

The main aim of this study is to examine the relationship between personality traits of parents and their daughters with AN. In the context of literature on the subject, the following hypothesis were made: (1) we expect to find the “Triad of Anorexia” of Fassino et al. (2002) at the onset of AN, adolescents with AN will show higher harm avoidance, lower novelty seeking, higher persistence, and lower self-directness than controls; (2) we expect that AN mothers or fathers will present high scores in HA and P compared to CG parents, (3) we expect associations of the mothers or fathers with their daughters in HA and P profiles and differences with the control group, and (4) parents of adolescents with AN will show low HA and high P scores compared with control group parents.

Method

Participants

The sample included 100 Caucasian girls with ages between 12 and 17, and their families. Half of the sample were fifty adolescents diagnosed with AN in an early stage, with less than a year of evolution since diagnosis, formed the AN group.

Regarding the sample size, taking into account weight concerns assessed through the Eating Disorders Inventory-2 (Garner, 1991), considered as one of the most well-supported risk factors for ED, a mean effect size of area under normal curve (AUC) of 0.746 was found in one of the main reviews regarding risk factors in this pathology (Jacobi et al., 2004). Based on that mean effect size, the Cohen’s d was calculated ($d=0.936$). The G*Power program (latest ver. 3.1.9.7; Heinrich-Heine-Universität Düsseldorf, Düsseldorf, Germany) was used to calculate the sample size required to detect this effect, thereby obtaining an estimated sample size per group of 27. Based on these suggestions, a sample size of 40 or 50 was considered enough to reach good effect sizes.

Participants presented a diagnosis of anorexia nervosa restrictive subtype (AN-R). They had a mean age of 14.66 ± 1.39 years and a mean body mass index (BMI) of 16.08 ± 1.74 kg/m². BMI were found it was significantly lower in AN group than CG. Mean duration of ED was 10.32 months ($SD= 7.41$). The parental socioeconomic status of the AN group was 68% high, 12% medium, and 20% low. The AN group was matched to a CG with 50 adolescents. The CG did not meet the criteria after clinical interview for any psychological diagnosis.

Mothers and fathers were comparable in the educational status in both groups. The ages of CG fathers were statistically higher than those of the AN fathers. The ages in case of the mothers were also higher in the CG. Participants' characteristics are described in the Table 1 in which AN group is compared with CG.

Exclusion criteria included BMI out of the normal range (>18.5 BMI <24.99), presence of metabolic disorders that could affect body mass index, or a psychosis disorder.

Table 1
Sociodemographic characteristics of the families and their daughters

Characteristics	G-AN (n= 50)	CG (n= 50)	χ^2 / t	d
	M (SD)/%	M (SD)/%		
Parents				
Father's age	47.54 (4.79)	51.02 (4.44)	$t=-3.65^{***}$	0.75
Mother's age	45.55 (3.62)	48.30 (3.54)	$t= -3.28^{***}$	0.76
Father's education level				
Compulsory	12.2%	18.8%	$\chi^2= 2.99$	
Secondary	22.4%	33.3%		
Superior	65.3%	47.9%		
Mother's education level				
Compulsory	16%	12%	$\chi^2= 1.18$	
Secundario	30%	40%		
Superior	54%	48%		
Socio-economic status				
I o II (low)	20%	14%	$\chi^2= 0.66$	
III (medium)	12%	14%		
IV o V (high)	68%	72%		
Adolescents				
Age	14.68 (1.39)	14.66 (1.32)	$t= 0.074$	
BMI (kg/m2)	16.06 (1.74)	21.18 (2.67)	$t= -12.46^{***}$	2.51
Duration of disorder (months)	10.32 (7.41)	--	--	
Duration of treatment (moths)	3.30 (4.43)	--	--	
School performance				
High/average	86%	81%	$\chi^2= 0.43$	
Low	14%	19%		

Note: * $p < .05$; ** $p < .01$; *** $p < .001$.

Measures

- 1) *Kiddie-Schedule for Affective Disorders and Schizophrenia Interview* (K-SADS-PL; Kaufman et al., 1997), Spanish version by Ulloa et al. (2006). The K-SADS-PL is a semi-structured interview developed to diagnose children and adolescents using DSM-IV Axis I diagnoses. Diagnoses were adapted to DSM-5 (APA, 2013).
- 2) *Hollingshead Redlich Scale* (Hollingshead & Redlich, 1958). This scale considers the work status of parents and their education levels. Socioeconomic status was calculated following this scale. The final socioeconomic status that was considered for each participant was the highest of both parents.
- 3) *Temperament and Character Inventory Revised* (TCI-R-67; Cloninger, 1999), Spanish abbreviated and validated version by Pedrero-Pérez (2009). The TCI-R-67 was used to evaluate parents' personality. Unlike the original that included 240 items, this version consists of 67 items. TCI-R is a self-report questionnaire assessing four temperament and four-character dimensions. It comprises 8 subscales (each of them formed by 8 items, except the "Exploratory Excitability" that is formed by 6) and 5 control items. The internal consistency of each of the scales and their correlations with those of the initial questionnaire are adequate. Temperament dimensions: Novelty seeking ($\alpha = .79$), Harm avoidance ($\alpha = .79$), Reward dependence ($\alpha = .86$) and Persistence ($\alpha = .82$); and Character dimensions: Self-directedness ($\alpha = .85$), Cooperativeness ($\alpha = .79$), Self-transcendence ($\alpha = .80$), and Exploratory excitability ($\alpha = .65$). The values calculated for the current study in temperament dimensions were Novelty seeking ($\alpha = .61$), Harm avoidance ($\alpha = .79$), Reward dependence ($\alpha = .62$) and Persistence ($\alpha = .71$); and in character dimensions were Self-directedness ($\alpha = .70$), Cooperativeness ($\alpha = .68$), Self-transcendence ($\alpha = .55$) and Exploratory excitability ($\alpha = .78$).
- 4) *Junior Temperament and Character Inventory* (JTCI), Spanish validated version by Pelaz-Antolín (2006). It is a questionnaire to assess daughters' personality comprising 108 items with 7 scales. In the original instrument in Spanish population four of the scales measure Temperament: Novelty seeking ($\alpha = .64$), Harm avoidance ($\alpha = .76$), Reward dependence ($\alpha = .47$), and Persistence ($\alpha = .42$); and three measure Character wherein the last scale includes two subscales: Self-directedness ($\alpha = .67$), Cooperativeness ($\alpha = .61$), and Self-transcendence: Fantasy ($\alpha = .62$) and Spirituality ($\alpha = .49$). The value calculated for the current sample varies between .71 and .85 on the Self-directness, Cooperativeness and Fantasy scales, and between .51 and .60 on Harm avoidance, Reward dependence and Persistence. The internal consistency obtained in the validation was lower than in the case of the parents.
- 5) *Eating Disorder Inventory-2* (EDI-2; Garner, 1998), Spanish adapted and validated version by Corral et al. (1998). The EDI-2 was used to assess eating pathology. It includes 11 subscales: Drive for thinness (DT), Body dissatisfaction (BD), Bulimia (B), Ineffectiveness (I), Perfectionism (P), Interpersonal distrust (ID), Interoceptive awareness (IA), Maturity fears (MF), Ascetism (A), Impulse regulation (IR), and Social insecurity (SI). EDI-2 consists of 91-item on a six-point Likert scale where

“sometimes”, “rarely”, and “never” are assigned a score of zero, while “often”, “usually”, and “always” are assigned 1, 2, and 3, respectively. The EDI-2 total score ranges from 91 to 546 and possesses good psychometric properties with an internal consistency of .83-.92. For the current study the Cronbach alpha were DT= .90; BD= .71; B= .82; I= .88; P= .91; ID= .91; IA= .85.

Procedure

The design proposed is a case-control study with ED as the case group matched by sex, age, and socioeconomic status of the parents with a control group (CG) without pathology (1:1). The data reported in this research was derived from the ANOVAS study (Sepúlveda et al., 2022), which establishes differences in biological, psychological, and familial variables between both groups of participants.

The recruitment was carried out between 2012 and 2016. Confidentiality was guaranteed for all the participants and the information was collected and compiled. This study was approved by the Ethic Committee of the Hospital del Niño Jesus (Ref Code. R-0009/10) and the Ethic Research Committee (UAM, CEI 25-673).

Data analysis

Data was pseudonymised (names converted into numbers for research purposes; bidirectional). Descriptive statistics were calculated for all variables. Demographic variables were tested using Chi Square test and comparisons between AN group and CG were carried out using independent samples t test. To analyze the correlation between single temperament and character dimensions of the parents and their daughters, Pearson bivariate correlation was used. Discriminant analysis between groups was performed to test the ability of TCI to classify individuals in the correct group. The discriminant analysis included TCI personality scores between AN and CG daughters, AN mothers (AN_{mo}) and CG mothers (CG_{mo}), and AN fathers (AN_{fa}) and CG fathers (CG_{fa}). Finally, EDI-2 scales were included in the discriminant analysis between AN daughters and CG daughters to test which scale was the strongest discriminating between AN adolescents and CG adolescents.

Statistical analyses were carried out using the statistical software SPSS version 25.0 in its version for Mac. The analyses were performed with a significance level of 0.05. Different comparisons were carried out and Holm’s Sequential Bonferroni Procedure (Holm, 1979), which deals with familywise error rates for multiple hypothesis tests, was applied; p was adjusted with Bonferroni correction for multiple comparisons ($p \leq 0.003$).

Results

Temperament and character traits differences

AN DAUGHTERS VS. CG DAUGHTERS. The profiles of the JTCI showed that adolescents of the AN group and those of the CG did not present significant differences in any of the scales (Table 2).

AN MOTHERS VS. CG MOTHERS. The two groups of mothers showed differences in every scale of the questionnaire in the Table 2. The AN_{mo} presented lower scores than the CG_{mo} in the temperament scales: NS ($t= 11.57, p=.001$) and HA ($t= 2.17, p=.033$), and in the character scale of ST ($t= 8.91, p=.001$). However, AN_{mo} presented higher scores in the temperament scales: RD ($t= -9.32, p=0.001$) and P ($t= -7.30, p=.001$), and in the character scales: SD ($t= -9.66, p=.001$) and CO ($t= -13.15, p=.001$).

AN FATHERS VS. CG FATHERS. The AN_{fa} presented lower scores than the CG_{fa} in the temperament scales (see Table 2): NS ($t= 2.46, p=.016$) and HA ($t= 5.81, p=.001$), and in the character scale of ST ($t= 8.71, p=.001$), while it presented higher scores than the CG_{fa} in the temperament scales: RD ($t= -4.25, p=.001$) and P ($t= -9.67, p=.001$), and in the characters scales: SD ($t= 10.55, p=.001$) and CO ($t= -11.47, p=.001$). It can be observed AN_{fa} showed the same profile in temperament and character traits as AN_{mo}.

Comparison between daughters and parents

ANOREXIA NERVOSA GROUP. Mothers and adolescents showed significant direct correlations between the SD of the daughters and the P ($r= .39, p=.007$) of the mothers; and significant inverse correlations between the CO of the daughters and the HA of the mothers ($r= -.32, p=.03$), and the FA of the daughters and the HA of the mothers ($r= -.32, p=.03$).

Fathers and adolescents with AN showed significant direct correlation between the RD of the daughters and the RD of the fathers ($r= .49, p=.001$), the CO of the daughters and the NS of the fathers ($r= .38, p=.01$), the FA of the daughters and the SD of the fathers ($r= .32, p=.03$), and the NS of the fathers and the RD of the daughters ($r= .30, p=.05$); and inverse correlation between the HA of the fathers and the FA of the daughters ($r= -.31, p=.040$), and the P of the fathers and the SD of the daughters ($r= -0.38, p=.01$).

In case of mothers and fathers, there were positive correlations between HA_{mo} and HA_{fa} ($r= .61, p=.001$), HA_{mo} and ST_{fa} ($r= .39, p=.01$) and ST_{mo} and HA_{fa} ($r= .42, p=.005$). Conversely, there were inverse correlations between NS_{mo} and P_{fa} ($r= -.37; p=.01$), HA_{mo} and SD_{fa} ($r= -.48, p=.001$), SD_{mo} and HA_{fa} ($r= -.35, p=.02$), and ST_{mo} and SD_{fa} ($r= -0.31, p=.04$).

CONTROL GROUP. CG_{mo} and adolescents only correlated negatively among both CO profiles ($r= -.35, p=.01$), while CG parents and adolescents only correlated negatively with the P of their daughter and the ST of the father ($r= -.40, p=.01$). Mothers and fathers showed significant direct correlations between SD_{mo} and HA_{fa} ($r= .45, p=.005$), and ST_{mo} and P_{fa} ($r= .35, p=.03$).

Table 2
 Distribution of the mean scores and standard deviations in the dimensions of temperament and character in
 the G-AN ($n= 50$) and the GC ($n= 50$)

TCI dimensions	G-AN M (SD)	ANmo M (SD)	ANfa M (SD)	CG M (SD)	CGmo M (SD)	CGfa M (SD)	d_{mo}	d_{fo}
Novelty seeking (NS)	7.2 (2.81)	15.34 (4.02)*	14.86 (3.72)*	7.27 (2.85)	26.28 (5.18)*	16.82 (3.45)*	2.35	0.53
Harm avoidance (HA)	7.04 (4.38)	18.62 (5.58)*	15.98 (4.99)*	6.82 (4.26)	20.53 (2.61)*	21.05 (2.30)*	0.44	1.07
Reward dependence (RD)	5.96 (2.20)	30.45 (5.78)*	27.79 (6.25)*	5.88 (2.22)	22.06 (2.57)*	23.28 (2.23)*	1.96	0.90
Persistence (P)	3.28 (1.77)	25.49 (4.94)*	27.58 (5.43)*	3.22 (1.75)	18.82 (4.04)*	17.95 (3.19)*	1.70	1.94
Self-directedness (SD)	15.70 (2.67)	34.87 (4.73)*	35.79 (3.65)*	15.71 (2.70)	26.86 (3.30)*	27.82 (3.14)*	1.99	2.21
Cooperativeness (CO)	16.76 (2.70)	33.89 (3.30)*	33.05 (3.84)*	16.65 (2.71)	24.49 (3.34)*	23.82 (3.42)*	2.27	2.54
Self-transcendence (ST)		14.42 (5.36)*	14.16 (4.87)*		22.49 (3.30)*	22.05 (3.02)*	1.92	1.95
Fantasy (FA)	1.44 (1.26)			1.39 (1.29)				
Spirituality (SP)	1.96 (1.28)			1.89 (1.22)				
Exploratory excitability		18.37 (4.25)*	17.95 (3.93)*		14,1 (3,03)*	15,13 (2,62)*		

Notes: AN= anorexia nervosa group girls; ANmo= anorexia nervosa mothers; ANfa= anorexia nervosa fathers; CG= control group girls; CGmo= control group mothers; CGfa= control group fathers. *Significant difference between AN-G and CG. The significant values after Boniferroni correction are in bold.

Eating psychopathology differences: G-AN vs. CG

While analyzing the differences in eating psychopathology scores between AN group and CG, the AN group presented significantly higher scores in DT, BD, I, ID, IA, A, and IR scales. In contrast, significant differences in B, P, MF and SI were not found.

Table 3

Distribution of the mean scores and standard deviation in the Eating Disorder Inventory-2 (EDI-2) of the adolescents with AN ($n= 50$) and the GC ($n= 50$)

EDI-2 dimensions	G-AN <i>M (SD)</i>	CG <i>M (SD)</i>
Drive for thinness (DT)	15.68 ± 11.0	6.75 ± 7.17***
Body dissatisfaction (BD)	12.87 ± 9.36	7.17 ± 7.85***
Bulimia (B)	3.25 ± 4.28	3.64 ± 3.77
Ineffectiveness (I)	11.72 ± 9.62	5.46 ± 6.78***
Perfectionism (P)	11.55 ± 6.37	10.87 ± 6.13
Interpersonal distrust (ID)	6.77 ± 4.84	4.1 ± 3.7*
Interoceptive awareness (IA)	14.7 ± 8.7	10.85 ± 7.23***
Maturity fears (MF)	14.45 ± 6.58	14.18 ± 6.4
Ascetism (A)	12.56 ± 7.67	8.62 ± 6.15***
Impulse regulation (IR)	10.57 ± 7.07	7.56 ± 6.33
Social insecurity (SI)	10.4 ± 4.46	8.5 ± 3.45**

Note: * $p < .05$; ** $p < .01$; *** $p < .001$.

Discriminant analysis

The discriminant analysis (Table 4) of all the dimensions of the TCI showed that the adolescents with AN were not differentiated from those in the CG (0%). In case of the mothers, the AN_{mo} was correctly differentiated from the CG_{mo} (canonical correlation: 0.94, correct classification: 94%) and the AN_{fa} was also well differentiated from the CG_{fa} (canonical correlation: 0.91, correct classification: 98%).

The stepwise discriminant analysis was carried out to identify the most significant dimensions of the TCI to differentiate between the AN-G and the CG. In case of AN-G and CG adolescents, none of the subscales showed statistical significance to discriminate between groups.

In case of the mothers, the subscales NS, HA, P, SD, CO, and ST discriminated between the AN_{mo} and the CG_{mo} (canonical correlation: 0.94, correct classification: 94%), whereas the groups AN_{fa} and CG_{fa} discriminated in the subscales CO, SD, P, HA, ST, RD, and NS (canonical correlation: 0.91, correct classification: 98%).

Discriminant analysis of parents' TCI dimensions that contributed most to the differentiation of AN_{mo} and CG_{mo} were NS, HA, P, SD, CO, and ST. AN_{fa} and CG_{fa} were discriminated by CO, SD, P, HA, ST, RD, and NS. In contrast to the research by Fassino

(2002), who found that the TCI had the capacity to poorly differentiate (59%) the mothers of both groups based on the SD dimension, more dimensions are necessary in our study to differentiate between AN_{mo} and CG_{mo} reaching a perfect classification (100%) of mothers in their groups (AN vs. CG). During the investigation by Fassino (2002), the fathers were classified to their group based on P and SD (80%), while more dimensions were required to differentiate between both groups of parents, thereby achieving a better classification rate based on their TCI scores (98%).

Table 4

Discriminant analysis with Temperament and Character Inventory (TCI): Correct classification percentage and λ Wilks

Groups	AN (n= 50)	CG (n= 50)	ANmo (n= 50)	CGmo (n= 50)	ANfa (n= 50)	CGfa (n= 50)
AN	0(0%)	0(0%)	--	--	--	--
CG	0(0%)	0(0%)	--	--	--	--
ANmo	--	--	47(94%)	0(0%)	--	--
CGmo	--	--	3(6%)	50(100%)	--	--
ANfa	--	--	--	--	49(98%)	12(24%)
CGfa	--	--	--	--	1(2%)	38(76%)
λ Wilks	--	--	.122	.122	.182	.182
Canonical <i>r</i>	--	--	.96	.96	.91	.91
Eigenvalue	--	--	7.21	7.21	4.50	4.50

Note: AN= anorexia nervosa group girls; ANmo= anorexia nervosa mothers; ANfa= anorexia nervosa fathers; CG= control group girls; CGmo= control group mothers; CGfa= control group fathers.

Discriminant analysis including eating psychopathology

A discriminant analysis was performed using the groups of AN-G and CG (Table 5) including all the scales of the EDI-2 obtaining a canonical correlation of 0.56 (correct classification: 74.7%). The only scale that discriminated between the two groups was Drive for thinness (DT).

Stepwise discriminant analysis was performed to identify the most significant dimensions in each group (AN vs. CG). Adolescents scores in JTCI test were not able to differentiate between both groups. The dimension that discriminated between both adolescents' groups after including EDI-2 in the analysis was DT.

Table 5
Discriminant analysis with the Eating Disorder Inventory-2 (EDI-2): Correct classification percentages and λ Wilks

Group	Anorexia nervosa group girls (n= 50)	Control group girls (n= 50)
Anorexia nervosa group girls	36(72%)	5(12%)
Control group girls	14(28%)	45(90%)
λ de Wilks	0.69	
Canonical r	0.56	
Eigenvalue	1.03	

Discussion

The main aim of the current study was to examine the relationship between personality traits of parents and their daughters with AN and confirm if it is possible to describe a personality profile associated with eating disorders psychopathology through a rigorous case-control design.

Following suggestions on the examination of the ED risk factors by Jacobi et al. (2004), the study was designed to target the earliest stages of the pathology. To our knowledge, this is one of the first studies that assesses the personality of adolescents at the onset of an eating disorder and their both parents' personality. This design takes into account the precedence and the interaction between several personality factors, both concerning the daughters and the mothers and fathers, to add robustness to the overall design of the study wherein personality is very important because of the role it plays in the etiology, course, and outcome of AN (Farstad et al., 2016).

Contrary to expected in the first prediction, results confirmed strong similarities between AN adolescents at the onset of illness and girls without pathology in terms of personality traits. Individuals with AN demonstrate low levels of NS and high levels of HA compared to controls (Fassino et al. 2002; Karwautz et al. 2003; Jacobs et al., 2009; Bennett et al., 2015; Farstad et al., 2016). However, in this study, differences between AN and CG were not found; even so, the scores are low in NS and high in HA and, in contrast to previous studies, the level of persistence is low, so results did not confirm the "anorectic triad" found by Fassino et al. (2002). The substantial changes in personality occur during adolescence development (Zohar et al., 2018), and AN group girls and CG girls were matched by age. Therefore, similar to the studies of Fassino et al. (2002), significant differences in personality were not found while comparing early-onset vs. late-onset concerning women with AN. Results found in this study can be related to the tendency of negative emotions such as shyness, fear of uncertainty, worrying, and pessimism, along with the low tendency for exploratory activity, the avoidance of frustration, and with the age of the sample where the average mean of the samples is close to 15 years old.

The second hypothesis was partially confirmed. Results confirmed that AN_{mo} presented higher scores than CG_{mo} in the temperament traits of RD and P, and in the

character traits of SD and CO; and lower scores in the temperament traits of NS and HA, and in the character trait of ST. In the current sample, AN_{fa} showed the same profile in temperament and character traits as AN_{mo}, which is in contrast to the previous studies that established higher levels of HA and P, and lower levels of SD (Barajas-Iglesias et al., 2017; Farstad et al., 2016; Fassino et al., 2002, 2004). Recent meta-analysis of personality traits using Cloninger Theory has shown the existence of a positive relationship between high P and AN, and a negative relationship between NS and AN (Komasi et al., 2022). High SD and HA have been traits related to eating disorders in several research (Amianto et al., 2013; Fassino et al., 2009, 2013). In our sample, girls are present in the early stages of the disorder, while in previous investigations, the samples of girls with AN experienced a longer duration of the disorder and the parents showed higher levels of HA (Cassin & von Ranson, 2005; Fassino et al., 2002, 2004, 2009). One of the arguments behind this finding in AN parents' personality traits is that HA may be a personality factor that facilitates to handle the emotional burden triggered by the disorder (Monteleone et al., 2021) and it could be increased in more advanced phases of their daughters' AN. In future research, it would be important to address whether the duration of the illness can modulate some of the personality factors of mothers and fathers.

Regarding the associations between adolescents and their mothers and fathers, results showed interesting differences in AN group and CG. AN_{mo} and adolescents with AN present inverse correlation between HA of mothers and CO of adolescents, and between HA of mothers and FA of daughters. AN_{mo} and adolescents' personality were complementary. Cooperativeness and Fantasy of adolescents is related with the HA in their mothers. Increased cooperativeness of daughters decreases HA in mothers, which could modulate adolescents' personality. HA has been proposed as an important risk factor in the development of eating disorders (Atiye et al., 2015; Marzola et al., 2019). In contrast, mothers and adolescents in CG correlated inversely in cooperativeness, a degree of general adjustment in their relationship and the expression of empathy that facilitates links with other people and has been associated with maturity. This has been described in previous investigations as a significant predictor of well-being, physical, mental, and social components in adolescents' health and happiness (Cloninger and Zohar, 2011; Garcia et al., 2012; Moreira et al., 2015; Zohar et al., 2018).

Fathers and adolescents with AN showed a positive high correlation in RD. This trait may indicate a heritable bias in maintenance of ongoing behaviors related with processes such as social attachment, dependence on the approval of others, and being sentimental and affectionate (Cloninger et al., 1993). Another interesting finding of AN_{fa} and their daughters was the inverse association between P of fathers and SD of adolescents, which implies a decreased P of fathers if the daughter shows a high P. This trait is related with being responsible, purposeful, and resourceful in working to achieve goals and values. It could also imply an increased P in fathers to encourage their daughters to lead a higher P to study and work hard (Josefsson et al., 2013).

After analyzing correlations between mothers and fathers in each group, we found correlations between them in the AN group. They showed a strong direct correlation

between HA in mothers and HA in fathers. HA has been described as the behavioral inhibition system that reflects the tendency to respond intensely to aversive stimuli and avoid punishment (Garcia, 2011). High levels of HA in parents may lead to parental overprotection of their daughters (Gruber et al., 2020), and it may be related to a difficulty to grow up and an immature character with a high risk of psychopathology (Fassino et al., 2002). High HA is associated with anxiety, inhibition, and inflexibility and has been proposed as an important mediator that could explain the path from birth with obstetric complications to the development of AN (Favaro et al., 2008). Some theories hypothesize that personality traits are supposed to be relatively stable throughout life. Thus, their development should predate their daughter's ED and therefore may influence its development and expression (Allemand et al., 2013; Costa et al., 2019; Fassino et al., 2009). Studies focused on people with AN personality propose that there exists a low stability of personality in young and acute ill patients and residuals symptoms go on as scarring effects in recovered young samples (Wagner et al., 2019).

In terms of stepwise discriminant analysis in personality scales of daughters and their EDI-2 scores, DT was the scale that discriminated between AN adolescents and CG adolescents. The subscale of the EDI-2 denotes attitudes, perceptions, and behaviors associated with an intense desire for thinness, an excessive concern with weight, dieting, control, and avoiding weight gain (Davenport et al., 2015; Grilo, 2013; Viñuales Mas, 2001). DT and the thin-ideal internalization may influence the way in which an underlying vulnerability is expressed, and the specific symptomatology of AN can be used as an attempt for emotional regulation (Brockmeyer et al., 2014; Christian et al., 2020; Fiore et al., 2014; Hughes & Gullone, 2011) and control of anxiety sensitivity and negative emotionality. This sensitivity could be expressed by adolescents with AN through fears of rejection or criticism, and an internalized thin ideal to minimize social threats (Cardi et al., 2014; Sim & Peterson, 2021).

Findings in this study will allow improvement of the early intervention of these factors in parents and adolescents as well as developing treatment strategies at the onset of AN. Differentiating trait-related and state-related behavioral and neurobiological alterations in AN may be helpful in understanding the etiology and course of illness (Kaye et al., 2009; Wierenga et al., 2014). This would allow, as Lock (2015) concludes in his review on effective treatments in adolescents with EDs, to improve the treatment considering models that are based on neuroscience and cognition such as proposed model based on Herpetz-Dahlmann et al. (2011) confirmed in one study (Moreno-Encinas et al., 2021). Parents' personality and their influence on AN adolescent treatment will be an area to explore in future investigations. The strengths of this study include the sample matched by age and socioeconomic level to reduce the factors that could influence the results obtained as much as possible as well as the fact that the adolescents are in the early stages of the ED, and the inclusion of both parents of adolescents with AN. In terms of limitations, we can take into account the possible altered behavior of adolescents with AN-R by food deprivation presenting adaptive responses to starvation stress. Additionally, prospective and non-transversal designs are required to establish the temporal precedence of traits.

Adolescence is a distinctive developmental stage in which individuals require autonomy, independence, and inter-dependence on their nuclear family. In which it is insisted that personality alteration is considered a dimensional construct, focusing more on styles than on diagnostic categories (Caballo et al., 2011). Knowing the temperament and character traits of adolescents and their mothers and fathers can be a guide to carry out treatments adapted to their needs. This will allow improvement of the early intervention of these factors as well as developing treatment strategies in the early phases. Temperament traits are often viewed as vulnerabilities in developing AN and is an underlying contributor to how they think, feel, and respond; however, some authors hypothesize that these traits can be adaptively used in recovery; for instance, in the Temperament-Based Therapy with Supports (TBT-S) (Kaye et al., 2015). This is an emerging treatment approach that acknowledges and works with a person's temperament. Treatments till date have ignored the biological underpinnings that can trigger and influence ED symptoms. Temperament is important for support systems (parents, siblings, friends, and others) and clinicians to acknowledge and utilize in the treatment processes by using traits as strengths so as to use their own resources to manage their ED symptoms. Also, third generation therapies oriented towards acceptance, such as mindfulness techniques that appear to be effective with formal (yoga, sitting meditation) or informal practices (full attention in activities of daily living) according to Verdú and Quiles (2022) or Errasti-Pérez et al. (2022).

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RECEIVED: JULY 4, 2022

ACCEPTED: OCTOBER 3, 2022