

Anger expression in eating disorders: Clinical, psychopathological and personality correlates

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Abstract

The goals of the study were to compare anger expressions in individuals with eating disorders and healthy controls, and to explore the relation among eating disorder symptoms, comorbid psychopathology, personality traits, and impulsive behaviours. Participants comprised 135 eating disorder patients consecutively admitted to our unit and 103 healthy controls. Assessment measures included the Eating Disorders Inventory 2 (EDI-2), Bulimic Investigatory Test Edinburgh (BITE), Symptom Checklist-Revised (SCL-90-R), Social Avoidance Distress Scale (SAD), Temperament and Character Inventory-Revised (TCI-R), State-Trait Anger Expression Inventory 2 (STAXI-2), and other clinical and psychopathological indices. In the control group also the General Health Questionnaire-28 (GHQ-28) was also used. Women with eating disorders obtained significantly higher mean scores than controls on all STAXI-2 scales except for Anger Control. When various purging methods were assessed independently, the frequency of laxative use was associated with anger suppression. Eating disorder symptoms and specific personality traits were positively associated with different forms of anger expression. Finally, patients with higher scores on anger suppression were more likely to report self-harming behaviors. Eating disorder patients may have inadequate anger expression and deficits in coping with anger and frustration. Furthermore, different purging methods may be related to different facets of anger.

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1. Introduction

In eating disorders, anger and aggression are important psychopathologic traits (Fassino et al., 2001), which have been found to be associated with eating disorder subtype (Fassino et al., 2001), severity of eating disorder symptoms (Abbate-Daga et al., 2005), comorbidity (Fassino et al., 2003a), altered biochemical

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functioning (Coccaro et al., 1989), endocrinologic dysfunction (Bartolomucci et al., 2004; Coste et al., 2006) and poorer treatment outcome (Fava et al., 1995; Fassino et al., 2003b). Marked impulse dysregulation has also been related to difficulties in expressing anger (Tiller et al., 1995; Truglia et al., 2006). The present study explores the manner in which various facets of anger are linked to eating disorder symptoms, comorbid psychopathology, personality traits, and impulsive behaviors.

Aggressiveness can be defined as any behavior that is intended to harm. (Truglia et al., 2006). Research into the role of anger in eating disorders has been somewhat inconsistent and imprecise, which may in part be due to limits in the current conceptualization of this emotion. Anger has generally been considered as a unitary construct (Arnow et al., 1995). However, Spielberger (1996) suggested that anger should be conceptualized as a multifaceted construct, comprising anger states (a changeable emotional condition consisting of subjective feelings of tension, annoyance, irritation, fury, or rage, frequently accompanied by the activation of the autonomic nervous system) and anger traits (an enduring personality feature, displaying individual differences in the incidence with which state anger is experienced over time). In addition, Spielberger remarked that individuals can differ in the ways in which they express or suppress their anger (Spielberger, 1996).

1.1. Anger and eating disorders

Little is known about the role that anger plays in eating disorders. The few studies assessing anger in eating disorders have generally revealed that individuals with eating disorders, especially bulimia nervosa (BN) patients, report higher anger levels than healthy controls (Fava et al., 1995; Tiller et al., 1995; Milligan and Waller, 2000; Fassino et al., 2001; Zaitsoff et al., 2002). Independent of diagnosis, elevated levels of unexpressed anger have been revealed in individuals with eating disorders (Milligan and Waller, 2000). More specifically, Arnow et al. (1995) outlined that anger plays a very important role in affect-driven overeating and bingeing. In relation to this, one unanswered question is whether severity of bulimic behaviors is related to higher levels of unexpressed anger, independent of diagnosis. The few studies that have addressed this topic have yielded contradictory findings with some studies indicating that anger outbursts were associated with greater severity of bulimic symptoms (Fava et al., 1995), while others found that individuals who vomited did not show more anger than those who did not vomit

(Fassino et al., 2001; Abbate-Daga et al., 2005). Further research is needed to clarify these inconsistencies.

1.2. Anger and personality

An important dimension to consider when studying anger in eating disorders is the underlying personality traits (Fassino et al., 2001, 2002). Contrasting personality profiles reveal high harm avoidance, reward dependence, and low novelty seeking in individuals with anorexia nervosa (AN) and high impulsivity, sensation seeking and novelty seeking in individuals with bulimic presentations (Klump et al., 2000). To date, the few studies that have assessed anger and personality concurrently have not revealed replicable patterns of association between particular personality profiles and anger expression (Fassino et al., 2003a,c; Abbate-Daga et al., 2005); however, considerable room for further work in this area exists.

1.3. Anger and impulsivity

Impulsivity is the only trait that has consistently been found to be associated with anger and eating disorder symptoms. Various researchers have suggested that negative affective states (particularly anger) are strongly related to impulsive behaviors in eating disordered patients (Favaro and Santonastaso, 1999) such as suicidal and parasuicidal gestures (Rodriguez-Cano et al., 2006), self-injurious behavior (Grant et al., 2005), drug or alcohol abuse (Bulik et al., 2004), stealing (Grant and Kim, 2002), and sexual promiscuity (Wiederman et al., 1996; Matsunaga et al., 2000). Further validation of the relation between impulsivity and anger is required.

In sum, further research on anger in individuals with eating disorders is potentially useful, since anger may have some etiological role and therefore could be a premorbid personality characteristic and/or a risk factor for developing eating disorders. Furthermore, high levels of anger may also be a barrier to treatment by maintaining psychopathology and should therefore be addressed in treatment (Fassino et al., 2002, 2003b).

The present study extends previous research on the association between eating disorders and anger by assessing whether the severity of bulimic features is related to anger expression. Taking a transdiagnostic approach rather than relying exclusively on diagnostic categories might allow us to understand why treatment outcome is not always directly related to the severity of bulimic symptoms and might also enable us to tailor treatment modules to specific needs of patients with deficits in particular areas. Furthermore, the detection of

particular character and temperament traits and psychopathologic and impulsive cores in relation to anger expressions has not been assessed previously and is of great interest, as it may allow us to identify individuals who are at greater risk of developing severe clinical eating disorder symptoms.

1.4. Aims of the study

Given the current gaps in the literature, the goals of the present study were fourfold: (1) to compare various facets of anger expression in individuals with eating disorders and healthy controls; (2) to explore the specific relation between anger and bulimic behaviors; (3) to explore the relation of anger expression to eating disorder symptoms, general psychopathological features, and personality traits; (4) to determine the relation between anger expressions and self-damaging impulsive behaviors.

We hypothesized that there would be higher scores on general anger expression in patients with eating disorders than controls and that patients with bulimic behaviors would score significantly higher on Anger-In (a measure of anger suppression). Moreover, we hypothesized that individuals with intense urges to express anger would also display a variety of impulsive self-destructive behaviors.

2. Method

2.1. Participants

The present study employed a case-control design. Entry into the study took place between January 2005 and March 2006. The total sample comprised 238 participants from the province of Catalonia. The mean age of the total sample was 25.15 (S.D.=5.7) years. Age did not differ significantly between the eating disordered patients and the controls (eating disorder cohort: mean=25.6, S.D.=6.7; controls cohort: 24.6, S.D.=4.3; $P=0.184$). The psychiatric cohort (the case group) included 135 eating disorder patients who had consecutively attended the public outpatient primary mental health service at the University Hospital of Bellvitge. In this group, 15.5% were diagnosed with AN, 55.6% with BN and 28.9% with eating disorder not otherwise specified (EDNOS). All patients met DSM-IV TR criteria (American Psychiatric Association, 2000a) for these disorders. The majority of the patients were single (76.1%) and had completed secondary education (83.1%). Less than half of the patients were employed (38.5%). The mean age of onset of the eating disorder was 18.8 years (S.D.=5) and the mean duration of the disorder was 6.6 years (S.D.=5). The mean number of previous treatments was 0.9 (S.D.=1).

Participants reported a weekly average of 5.4 binge eating episodes (S.D.=7.5), 5.0 vomiting episodes (S.D.=7.8), 3.6 laxative use episodes (S.D.=7.4) and 1.0 diuretic use episodes (S.D.=4.8). Their mean BMI at assessment was 21.9 kg/m² (S.D.=15.1).

The exclusion criteria for the study for the eating disorder sample were: (a) male sex; (b) missing values for any diagnostic items (American Psychiatric Association, 2000a); (c) unable to complete the assessment because of cognitive impairment; or (d) current psychotic disorder. For the present analysis, the following individuals had to be excluded from an initial sample of 151 patients: a) males ($N=6$), as the number of males with these diagnoses was too small for meaningful comparisons; b) patients with missing values for any diagnostic tools ($N=8$); and (c) individuals with too many missing values on the assessment tools ($N=12$). Disposition decisions were made by psychologists or psychiatrists who completed the anamnesis together with the treatment team according to published treatment guidelines (Fernández-Aranda and Turon, 1998; American Psychiatric Association, 2000b). From an initial sample of 135 controls, the following individuals were excluded: a) males ($N=4$); b) participants who rejected the assessment ($N=23$) and c) individuals with a current psychiatric condition, screened by the GHQ-28 (Goldberg, 1981) ($N=5$). All participants provided informed consent and the study was approved by the Ethics committee of our University Hospital.

2.2. Assessment

2.2.1. Eating Disorders Inventory 2 (EDI-2; Garner, 1991)

This is a reliable and valid 91-item multidimensional self-report questionnaire that assesses different cognitive and behavioral characteristics, which are typical for eating disorders. The 11 subscales are: Drive for Thinness, Bulimia, Body Dissatisfaction, Ineffectiveness, Perfectionism, Interpersonal Distrust, Interoceptive Awareness, Maturity Fears, Asceticism, Impulse Regulation and Social Insecurity. This instrument was validated in a Spanish population (Garner, 1998) with a mean internal consistency of 0.63 (coefficient alpha).

2.2.2. The Bulimic Investigatory Test Edinburgh (BITE; Henderson and Freeman, 1987)

This questionnaire contains 33 items that measure the presence and the severity of the symptoms of bulimia. There are two subscales: the symptomatology scale (30 items), which determines the seriousness of the symptoms, and the severity scale (3 items), which offers a severity index. This questionnaire has been found to

have a high internal consistency (Cronbach's alpha coefficient range: 0.96) and has been adapted to the Spanish population (Rivas et al., 2004).

2.2.3. *Symptom Checklist-Revised (SCL-90-R; Derogatis, 1990)*

In order to evaluate a broad range of psychological problems and symptoms of psychopathology, the SCL-90-R was employed. For the present study, only the global indices, namely the global severity index (GSI), the positive symptom distress index (PSDI) and the positive symptom total (PST), were used. This scale has been validated in a Spanish population (Derogatis, 2002), obtaining a mean internal consistency of 0.75 (coefficient alpha).

2.2.4. *Social Avoidance Distress Scale (SAD; Watson and Friend, 1969)*

This 28-item scale was designed to measure the degree of distress, discomfort, anxiety and avoidance of social situations. This scale was also adapted to the Spanish population and yielded a high internal consistency (Cronbach's alpha coefficient=0.90) (Bobes et al., 1999).

2.2.5. *State-Trait Anger Expression Inventory 2 (STAXI-2; Spielberger, 1996)*

The STAXI-2 (Spielberger, 1996) is a 44-item self-report instrument that examines the experience and expression of anger. It entails six scales and two subscales: 1) State Anger; 2) Trait Anger (including two subscales: a) Angry Temperament and b) Reaction to Criticism; 3) Anger Control (including two subscales: a) Anger Control-Out and b) Anger Control-In); 4) Anger Expression-In (Anger Suppression); 5) Anger Expression-Out and 6) Anger Expression, which provides a general index of the expression of anger (derived from the Anger Expression-In, the Anger Expression-Out and the Anger Control scales). The Spanish version of the STAXI-2 comprises 49 items and includes three additional subscales of the Anger State scale, which are a) Sentiment, b) Verbal Expression and c) Physical Expression. For the present study a summary score of these three Anger State subscales was utilized. In addition the Anger-Control scale is subdivided into a) Anger Control-In and b) Anger Control-Out. Items are rated on four-point Likert scales assessing either the intensity of the angry feelings or the frequency with which anger is experienced, expressed, suppressed, or controlled. A higher score is always indicative of greater levels of the assessed anger construct. The STAXI-2 has been found to have good psychometric properties (including reli-

ability and clinical validity) across a range of normal and clinical populations (Spielberger, 1996). This instrument was validated in a Spanish population with Cronbach's alpha coefficients ranging between 0.63 and 0.95 (Fernández-Abascal and Martin, 1995; Miguel-Tobal et al., 1997).

2.2.6. *Temperament and Character Inventory-Revised (TCI-R; Cloninger, 1999)*

The TCI-R (Cloninger, 1999) is a 240-item, 5-point Likert scale that reliably measures, as in the original TCI version (Cloninger et al., 1993), seven dimensions of personality: four temperament (Harm Avoidance, Novelty Seeking, Reward Dependence and Persistence) and three character dimensions (Self-Directedness, Cooperativeness and Self-Transcendence). The psychometric characteristics of the Spanish version of the original questionnaire (Gutiérrez et al., 2001) and the revised version have been documented (Gutiérrez-Zotes et al., 2004). The scales in the latter showed an internal consistency (coefficient alpha) of 0.87.

2.2.7. *General Health Questionnaire-28 (GHQ-28; Goldberg, 1981)*

The GHQ-28 is a self-report questionnaire that has been designed to detect and assess individuals with an enlarged probability of a present psychiatric disorder. The GHQ-28 comprises four subscales: Somatic Symptoms, Anxiety and Insomnia, Social Dysfunction, and Severe Depression. In the current study a cutoff score of 6/7 (6=no case; 7=case) was employed to exclude individuals with an elevated likelihood of a present psychiatric disorder. In previous studies, this cutoff score has yielded a sensitivity of 76.9% and a specificity of 90.2% (Lobo et al., 1986). The GHQ-28 has been studied in various European countries and has been found to be a valid and reliable tool (Goldberg and Williams, 1996).

2.2.8. *Structured face to face interview (First et al., 1997)*

Structured face to face interviews were used to assess self-harm, where actual or lifetime regular self-injurious behaviours were considered (cutting/burning/hitting/scratching/hair pulling), encompassing all direct and intentional physical self-damage behaviours that did not lead to death. Additionally, impulse-control disorder and substance abuse/dependence, including lifetime ICDs and alcohol and drug abuse/dependence, were assessed with the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I) (First et al., 1997) and Lifetime suicide attempts (with the question "Have you ever attempted suicide?").

2.3. Procedure

In addition to the battery of assessments, the eating disorder group was evaluated with a structured clinical interview regarding their eating disorder and psychopathological symptoms and their family history of eating disorders (Fernández-Aranda and Turon, 1998). Interviews were conducted by experienced clinical psychologists with master's or doctoral degrees in a mentalhealth discipline who were not blind to diagnosis. Healthy controls were recruited from individuals visiting the hospital for routine blood tests. For the control group, screening for a current or lifetime eating disorder and/or general distress was measured by the GHQ-28 (Goldberg, 1981). None of the controls had a history of mental illness. All the controls were from the same catchment areas as the index patients. Demographic information was also obtained from all participants.

2.4. Statistical analysis

Analyses were carried out with SPSS 14.0. All significance tests were two-tailed and the Bonferroni correction was employed to control for multiple comparisons. Firstly, the forms of anger expression (STAXI-2 scores)

between eating disorder patients and controls were compared. Analysis of covariance was used to compare the means obtained through the STAXI quantitative measures. For the categorical STAXI-2 variable "anger state" (null-low-moderate-high), the proportions comparison was carried out by estimating the corresponding odds ratio (OR) after defining "null" as the reference category. Since AN and BN patients differed significantly in age of onset and duration of the disorder, all analyses were adjusted by these variables.

Secondly, the predictive value of the variables measuring anger expression for the bulimic behaviors was analyzed. We defined five different criteria for the eating disorder patients: the presence of bulimic behavior (yes/no) and the weekly frequency of bingeing and vomiting episodes as well as laxative and diuretic self-administration. Logistic regression models were used for the binary criterion "presence of bulimic symptoms" and multiple regressions for the other quantitative dependent variables. Global predictive value was estimated with Nagelkerke's R^2 (logistic regressions) and adjusted R^2 (linear regressions) coefficients. Independent models were also adjusted for the partial and total scores obtained from the STAXI-2 questionnaire. Finally, regressions were once again adjusted by age of onset and duration of the disorder.

Table 1
Comparison of anger expression between eating disorder patients and controls

	Adjusted means		Means comparisons (ANCOVA)			
	ED	Controls		MD	95% CI (MD)	
Trait anger/angry temperament	61.4	31.5	<0.0005	29.8	22.8; 36.8	
Trait anger/angry reaction	56.3	27.4	<0.0005	28.9	21.8; 35.9	
Trait anger	62.4	26.1	<0.0005	36.3	29.2; 43.4	
Anger expression-out	53.8	35.9	<0.0005	17.9	10.5; 25.2	
Anger expression-in	56.6	33.3	<0.0005	23.2	16.2; 30.2	
Anger control-out	41.0	62.0	<0.0005	-21.0	-27.9; -14.1	
Anger control-in	40.7	54.6	0.0036	-13.9	-21.5; -6.3	
Anger expression index	64.2	32.6	<0.0005	31.6	24.6; 38.7	
	Percentage		Proportions comparison (Logistics)			
	ED	Controls	P	OR	95% CI (MD)	
State anger	High	3.9%	0.0%	-	-	
	Moderate	16.3%	1.0%	0.0002	37.5	4.90 290
	Low	51.1%	33.7%	0.0009	3.46	1.95 6.15
	Null	28.8%	65.5%	<i>Reference level for estimating OR</i>		

Statistical procedures are adjusted by age of onset and illness duration and results include Bonferroni's correction. Samples size: ED=135 and Controls=103. MD: Mean difference (ED-Controls); OR: odds ratio vs. null level.

- The parameter could not be estimated.

Table 2
Logistic and linear regressions for exploring the predictive value of anger on bulimic behaviors

	Bulimic behaviors (yes/no) ^a				Frequency of vomits ^b					Frequency of laxatives ^b					Frequency of diuretics ^b					Frequency of binges ^b				
	OR	P	95% CI	R ²	B	β	P	95% CI: B	R ²	B	β	P	95% CI: B	R ²	B	β	P	95% CI: B	R ²	B	β	P	95% CI: B	R ²
Trait anger/angry temperament	1.01	0.06	1.00; 1.03	0.13	0.01	0.04	0.73	-0.04; 0.06	0.03	-0.00	-0.00	1.00	-0.05; 0.05	0.01	0.02	0.14	0.14	-0.01; 0.05	0.05	0.00	.001	0.95	-0.05; 0.03	0.05
Trait anger/angry reaction	0.99	0.37	0.98; 1.01		-0.03	-0.12	0.22	-0.08; 0.02		0.00	0.01	0.90	-0.05; 0.05		-0.03	-0.18	0.06	-0.06; 0.00		0.01	.047	0.63	-0.04; 0.06	
Anger expression-out	1.01	0.45	.990; 1.02	0.13	-0.02	-0.09	0.42	-0.08; 0.03		-0.00	-0.01	0.93	-0.05; 0.05	0.05	-0.01	-0.42	0.67	-0.04; 0.03	0.04	0.00	.005	0.96	-0.05; 0.05	0.05
Anger expression-in	1.01	0.15	1.00; 1.03		0.02	0.07	0.49	-0.03; 0.07		0.06	0.21	0.03	0.01; 0.10		0.01	0.90	0.37	-0.02; 0.05		0.02	.086	0.36	-0.03; 0.07	
Anger control-out	1.01	0.46	1.00; 1.03		-0.04	-0.14	0.23	-0.10; 0.03		0.04	0.01	0.90	-0.06; 0.06		-0.02	-1.2	0.24	-0.06; 0.02		0.00	.001	1.00	-0.06; 0.06	
Anger control-in	1.00	0.71	0.99; 1.02		-0.01	-0.04	0.72	-0.06; 0.04		0.01	0.04	0.70	-0.04; 0.06		0.02	0.98	0.33	-0.02; 0.05		-0.03	-.11	0.25	-0.08; 0.02	
Trait anger total score	1.01	0.47	0.99; 1.02	0.10	-0.05	-0.18	0.09	-0.10; 0.01	0.05	-0.02	-0.01	0.94	-0.06; 0.05	0.01	-0.01	-0.06	0.61	-0.04; 0.03	0.03	-0.01	-.06	0.60	-0.07; 0.05	0.05
Anger expression total index	1.00	0.98	0.98; 1.02		0.06	0.21	0.06	-0.01; 0.12		0.07	0.02	0.85	-0.05; 0.06		0.00	0.00	0.99	-0.04; 0.04		0.05	.18	0.10	-0.01; 0.11	
State anger Null	1.11	0.82	0.44; 2.78	0.13	1.57	0.10	0.33	-1.60; 4.74	0.02	1.16	0.08	0.45	-1.90; 4.18	0.04	0.47	0.05	0.64	-1.50; 2.44	0.03	1.06	.071	0.49	-2.00; 4.10	0.03
Moderate vs. Null	1.43	0.58	0.41; 5.03		1.49	0.07	0.48	-2.70; 5.66		3.62	0.19	0.07	-0.31; 7.55		-0.45	-0.04	0.73	-3.00; 2.13		1.52	.076	0.45	-2.50; 5.50	
High vs. Null	-	-	-		2.61	0.06	0.53	-5.60; 10.8		-0.69	-0.02	0.86	-8.50; 7.03		-0.27	-0.01	0.92	-5.30; 4.81		2.02	.046	0.61	-5.90; 9.90	

B: Non-standardized coefficient. β : Standardized coefficient.

- The parameter could not be estimated. Independent models obtained for individual and total scores. Regressions are adjusted by age of onset and illness duration.

^a Logistic models for binary response purging (yes/no).

^b Linear models for frequency of vomits, laxatives, diuretics and binges.

Table 3

Correlations between anger expression and clinical and personality psychometrical measures in eating disorder patients

	Trait ang/T	Trait ang/R	Trait total	AE out	AE in	AC out	AC in	Expres.index	Anger state
EDI2: total score	0.367**	0.334**	0.429*	0.312**	0.488**	-0.211*	-0.225*	0.386**	0.295**
BITE: symptoms score	0.180*	0.065	0.156	0.170	0.284**	-0.057	-0.148	0.233**	0.159
BITE: severity score	0.194*	0.049	0.130	0.185*	0.181*	-0.147	-0.074	0.181*	0.217*
SAD score	0.294**	0.244**	0.319**	0.287**	0.354**	-0.223*	-0.174	0.260**	0.235**
SCL-90-R: GSI score	0.480**	0.337**	0.470**	0.330**	0.532**	-0.184*	-0.220*	0.387**	0.449**
SCL-90-R: PST score	0.439**	0.229**	0.386**	0.251**	0.397**	-0.169	-0.192*	0.302**	0.364**
SCL-90-R: PSDI score	0.381**	0.397**	0.466**	0.344**	0.555**	-0.147	-0.206*	0.367**	0.401**
TCI-R: Novelty seeking	0.143	0.107	0.126	0.091	-0.044	0.011	0.023	0.057	0.037
TCI-R: Harm avoidance	0.170	0.298**	0.290**	0.167	0.232**	-0.137	-0.159	0.120	0.172
TCI-R: Reward dependence	-0.163	-0.198*	-0.211*	-0.075	-0.352**	0.083	0.170	-0.107	-0.145
TCI-R: Persistence	-0.036	-0.108	-0.077	-0.094	0.053	0.069	0.088	0.027	-0.009
TCI-R: Self-directedness	-0.449**	-0.409**	-0.500**	-0.264**	-0.444**	0.135	0.343**	-0.365**	-0.362**
TCI-R: Cooperativeness	-0.338**	-0.323**	-0.361**	-0.138	-0.262**	0.112	0.202*	-0.198*	-0.277**
TCI-R: Self-transcendence	0.115	-0.065	0.036	0.031	0.141	0.054	0.076	0.042	0.152

Trait Ang/T: Trait Anger/Angry Temperament; Trait Ang/R: Trait Anger/Angry Reaction; AE Out: Anger Expression-Out; AE In: Anger Expression-In; AC Out: Anger Control-Out; AC In: Anger Control-In; Expres. Index: Total Anger Expression Index; Anger State: ordinal variable measuring Global Anger State.

EDI-2: Eating Disorder Inventory 2; BITE: Bulimic Investigatory Test Edinburgh; SAD: Social Avoidance Distress Scale; SCL-90-R: Symptom Checklist 90-Revised; GSI: Global Severity Index; PST: Positive Symptom Total; PSDI: Positive Symptom Distress Index; TCI-R: Temperament and Character Inventory-Revised.

*Significant correlation at 0.05 level; **Significant correlation at 0.01 level.

Next, the association between the anger expressions and the primary clinical and personality features obtained only for the eating disorder patients was estimated. Pearson's correlation coefficient was used for the STAXI-2 quantitative variables and Spearman's non-parametric coefficient for the STAXI-2 categorical-ordinal variable "anger state."

Finally, (for eating disorder patients) comorbidity between anger expressions and self-damaging impulsive behaviors was evaluated for alcohol-drug abuse, suicidal ideation-attempts, self-harm, kleptomania, and compulsive buying. These associations were evaluated through ORs estimated with logistic regression models adjusted by the patient's diagnostic subtype. Independent models were defined for the total and partial scores obtained through the STAXI-2.

3. Results

3.1. Anger in women with eating disorders and controls

Table 1 contains the comparisons of anger expressions between eating disorder patients and controls. These results indicate that women with eating disorders obtained higher mean scores than the controls on all the STAXI-2 scales except for the Anger Control (In-Out) scales, where the scores were lower for the eating disorder patients. The global "Anger State" level also differed between patients and controls: only 1% of individuals

without an eating disorder acquired a moderate level on this variable (0% obtained a high score), whereas 20.2% of the eating disorder patients reported moderate or high levels. The odds of achieving a low vs. null level was 3.46 times higher for the eating disorder patients and the odds of a moderate vs. null level was 37.5 times higher.

3.2. Anger and bulimic behaviors

Regarding the predictive value of anger expressions on bulimic behaviors, Table 2 indicates that the frequency of laxative use is increased for women with higher scores on the Anger Expression-In measure ($B=0.06$; $P=0.03$). No statistical association was found between general bulimic behaviors, weekly frequency of vomiting, bingeing and diuretic use, and any of the remaining STAXI-2 scales.

3.3. Anger and clinical and personality features in eating disorders

As shown in Table 3, Anger Expression was positively associated with several clinical eating disorder symptoms, measured by the EDI-2 and BITE, but also with SAD scores. Regarding personality traits (TCI-R scores), whereas Harm Avoidance was positively associated with Anger Expression Scales, Reward Dependence was negatively related. Conversely, Self-directedness and Cooperativeness TCI-R scores, yielded

negative correlations for the STAXI-2 scales, except for the Expression Index and State Anger.

3.4. Anger and psychopathology

As shown in Table 3, almost all the current psychopathological symptoms (measured by SCL 90-R) were positively related to Anger Expression, whereas Anger Control subscales (In–Out) were negatively correlated. Independent of diagnostic subtype, higher scores in Anger Expression-Out are linked to decreased odds of suicide attempts (OR=0.98, 95% CI: 0.96 to 0.99; $P=0.011$), and higher scores in Anger Control-Out are associated with decreased odds of compulsive buying (OR=0.97, 95% CI: 0.95 to 0.99; $P=0.018$). Moreover, higher Anger Expression-In was related to increased odds of self-harm behavior (OR=1.03, 95% CI: 1.01 to 1.04; $P=0.001$). Alcohol and drug abuse, suicidal ideation and kleptomania showed no statistically significant correlations with any measures of anger expressions.

4. Discussion

The current study compared various facets of anger in individuals with eating disorders and healthy controls, explored the relation between anger and bulimic behaviors, and assessed the association between anger and eating disorder symptoms, general psychopathological features, and personality traits and explored the relation between anger and self-harm behaviors.

4.1. Anger in women with eating disorders and controls

Our first hypothesis was that eating disorder patients would exhibit higher scores on the anger expression index than controls. Correspondingly, the present results revealed that women with eating disorders obtained higher mean scores than the controls on all the STAXI-2 scales except for the Anger Control (In–Out) subscales. These results support the findings of previous studies indicating that eating disorder patients report higher anger levels than controls (Fassino et al., 2001). They suggest that eating disorder patients may have inadequate anger expression and skill deficits in dealing with anger and frustration. The extent to which this inadequate anger expression is associated with the development and maintenance of abnormal eating patterns remains unclear.

4.2. Anger and bulimic behaviors

Our second hypothesis, that individuals who exhibit bulimic behaviors would exhibit significantly higher

scores on the Anger Expression-In subscale than the patients without bulimic symptomatology, was supported, but only for frequency of laxative use. This finding is compatible with the results of research showing that laxative use is related to anger in general (Tozzi et al., 2006) and to anger suppression in particular (Waller et al., 2003; Truglia et al., 2006). The finding that only laxative use was directly associated with anger suppression indicates that different purging methods may be related to different facets of anger, as suggested by a previous study (Reba et al., 2006).

4.3. Anger and clinical, general psychopathology and personality features

A further objective of the present study was to assess the relation between general anger expression and eating disorder symptoms, psychopathological features, and selected personality traits. Our results suggest that anger expression was positively related to eating disorder severity. Correspondingly, previous studies have reported associations between severity of disturbed eating patterns and difficulty in expressing anger (Fava et al., 1995). Another emergent finding was that general psychopathology and social anxiety were also positively linked to anger expression. Interestingly, compulsive buying was found to be negatively associated with Anger Control-Out. As reported in previous studies, compulsive buying is one of the most prevalent impulse-control disorders observed in eating disorders (Fernández-Aranda et al., 2006), and the most common chronology of onset pattern was for compulsive buying to precede eating disorders (Fernández-Aranda et al., 2008). This observation lends itself to the interpretation that a lack of Anger Control-Out, mediated by specific adverse environmental exposures and genetic factors, may predispose to some specific impulse-control disorders, namely compulsive buying. In summary, eating disorder patients with abnormal anger expression seem to present a greater severity of eating disorders and more general psychopathology.

Finally, in relation to personality, various significant relationships were found between general anger expression and some personality traits, namely harm avoidance and reward dependence. This finding contradicts previous studies that have indicated no association between personality, disordered eating and different ways of managing aggressive feelings in eating disordered individuals (Fassino et al., 2001). As expected, Harm Avoidance, commonly found in individuals with eating disorders (Fassino et al., 2003a; Klump et al., 2004), was positively related to Trait

Anger-Angry Reaction and Anger Expression-In. Contrastingly, Reward Dependence was found to be negatively related to Trait Anger-Angry Reaction and Anger Expression-In. This seems logical as individuals who rely on others for approval and reward are unlikely to view outwardly directed anger to be in service of those interpersonal goals.

4.4. Anger and self-harm behaviors

Our final hypothesis was that individuals with an intense urge to express anger would also display a variety of impulsive self-harm behaviors. In fact, in our sample, patients with higher Anger Expression-In and lower Anger Expression-Out were more likely to present associated self-harming (e.g. cutting, burning, suicide attempts) behaviors. A variety of self-destructive behaviors have been described in eating disorder patients (Claes et al., 2005; Solano et al., 2005). One possible interpretation is that individuals with eating disorders who internalize anger and have skill deficits in expressing anger may be more likely to engage in self-harm behaviors.

4.5. Treatment implications

The results of the present study also have clinical implications. First, the results emphasize the importance of conceptualizing anger as a multifaceted phenomenon. Second, bulimic behaviors were related to trait anger and thus reflect a more stable predisposition toward anger than previously thought. This indicates that anger is not merely caused by the presence of eating disorders and that it is therefore essential to address it directly. Therefore, if replicated, these findings support the further evaluation of the efficacy of affect-oriented treatments (e.g. dialectical behavior therapy) in eating disorders which target anger and hostility with the goal of improving the adaptive management of these emotions. This could be achieved by substituting emotion-focused coping mechanisms with a more problem-focused technique. The presence of certain bulimic behaviors such as laxative abuse might indicate which facets of anger need to be addressed therapeutically (Telch, 1997; Evershed et al., 2003; Palmer et al., 2003; Simpson et al., 2004).

4.6. Limitations

These results should be considered within the context of several limitations. First, the retrospective and self-report data collection procedures may limit the validity

and the reliability of our findings, which are subject to unreliability of individual recall and potential memory bias. Second, the cross-sectional design does not allow us to determine causality of the variables assessed. Third, since we did not account for a lifetime eating disorder in the control sample, we cannot rule out that some controls may have had eating disorder symptoms. On the other hand, this represents a more realistic and natural control group and a conservative bias. Moreover, the risk of spurious results due to comorbidity of index patients with Axis I and Axis II diagnoses should be considered. Finally, given that the study did not show causal relationships, other explanations could also have accounted for our results. Future research could expand these results with longitudinal designs that address the potential mediating role of anger in the etiology and clinical course of eating disorders.

In conclusion, this study found that among eating disorder patients anger is a common problem that merits further exploration. Furthermore, this study showed that diverse bulimic behaviors are related to different forms of anger expression. The present findings also contribute to an improved understanding of how the different facets of anger are associated with eating disorder symptomatology, clinical general psychopathological features, and personality traits. Finally, we observed that inappropriate anger expression was associated with self-harm behaviors in this population.

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