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Alexithymia in anorexia and bulimia: Ubiquitous and primary trait?

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Abstract: *Background*: Alexithymia is associated to Eating Disorders (ED) and relevant for their prognosis but it is uncertain if it is ubiquitous, primary, and necessary for ED outburst. *Methods*: 124 ED outpatients and 80 healthy controls were compared with the Toronto Alexithymia Scale, personality, and psychopathology measures. Alexithymia and the other features are compared between anorexia nervosa (AN), bulimia nervosa (BN) and control groups. Alexithymia-based clusters were explored and compared with controls. Alexithymia traits are correlated with the other features. *Results*: Difficulty in identifying feelings was ubiquitous in ED subjects. A Non-Alexithymic Cluster (NAC) and an Alexithymic Cluster (ALC) were found with no difference in AN/BN distribution. ALC displays disordered personality and high psychopathology. Self-directiveness and interoceptive awareness were independently related to alexithymia and to depressive feelings. These two features along with depressive features completely accounted for alexithymia variance. *Conclusion*: Even though the difficulty in identifying feelings is ubiquitous in ED subjects, Alexithymia may not represent a primary trait but a complex dysfunction consequent to co-occurring character immaturity, altered interoceptive awareness, and depressive traits.

ABOUT THE AUTHORS

The authors of the present research are devoted since many years to the research in the field of eating disorders. In particular they explored personality traits, eating and general psychopathology features, family functioning, and neuroimaging correlates related to these disorders. They also considered the issues pertaining the dropout and the resistance to treatment in the ED subjects responding with the formulation of new psychotherapic approaches to these subjects. They were interested in clinical research assessing the treatment outcome of these disorders as far as in the pathogenetic risk factors who can help clinicians to improve therapeutic approaches. Among these alexithymia is a relevant issue which was identified since the beginning of ED epidemics. The exploration of the alexithymia traits in ED subjects and the assessment of their relationship with personality and psychopathology features may improve the understanding of the pathogenic mechanism underlying these disorders to guide their psychotherapeutic approach.

PUBLIC INTEREST STATEMENT

The Alexithymia is a trait who impairs the recognition and verbal expression of own and others' emotions. This trait is not a disease but is associated to the origin and outcome of the eating disorders (ED).

The study compares 124 ED outpatients and 80 healthy controls (HC) as regards Alexithymia, personality, and symptoms to evidence if Alexithymia is always present in ED subjects and if it is primary or consequent to the other traits.

The difficulty in identifying feelings is higher in ED subjects than in HC. Nevertheless they are identified ED subjects with high and other with normal levels of Alexithymia. The ones with high levels in Alexithymia also display disorders of personality and high levels of symptoms. Thus our results sustain that even though the Alexithymia may foster the origin of EDs, it may be explained by character immaturity, alteration of perception of feelings and emotions and depressive traits in ED subjects.

Subjects: Behavioral Sciences; Health and Social Care; Health Conditions

Keywords: alexithymia; anorexia nervosa; bulimia nervosa; cluster analysis; eating psychopathology; personality traits

1. Introduction

Alexithymia is a general deficit in emotional regulation that reflects the inability to identify, understand or describe emotions (Taylor, 2000). Pervasive inability to identify and describe feelings and emotions, and poor use of fantasy were related to somatization (Abbate-Daga et al., 2013; Mattila et al., 2008), which would be an alternative expression of psychological disease, conflicts, and distress (Subic-Wrana, Beutel, Knebel, & Lane, 2010). For this reason alexithymic traits are supposed to be of relevance in the pathogenesis of EDs, which are considered psychosomatic and somatopsychic disorders (Halmi, 2005).

The exploration of alexithymic traits in EDs dates back to the last decade of past century (Bourke, Taylor, Parker, & Bagby, 1992; Cochrane, Brewerton, Wilson, & Hodges, 1993; Jimerson, Wolfe, Franko, Covino, & Sifneos, 1994). High levels of alexithymia characterize subjects affected with anorexia nervosa (AN) (Bourke et al., 1992; Cochrane et al., 1993; Corcos et al., 2000; Schmidt, Jiwany, & Treasure, 1993; Taylor, Parker, Bagby, & Bourke, 1996), bulimia nervosa (BN) (de Groot, Rodin, & Olmsted, 1995; Jimerson et al., 1994), and Binge Eating Disorder (BED) (Berger et al., 2014; Carano et al., 2012), with no differences between diagnostic subtypes (Berthoz, Perdereau, Godart, Corcos, & Haviland, 2007; Cochrane et al., 1993; Corcos et al., 2000; Lawson, Waller, Sines, & Meyer, 2008).

Several studies support the relevance of alexithymia for EDs pathogenesis (Schmidt et al., 1993; Taylor et al., 1996). Minuchin, Rosman, and Baker (1978), postulated that EDs were the expression of psychosomatic mechanisms involving a psychosomatic family system. Alexithymia largely accounted for the relationship between attachment avoidance and body esteem in AN (Keating, Tasca, & Hill, 2013). Alexithymia is a predisposing factor for perfectionism, which may influence the development of EDs (Marsero, Ruggiero, Scarone, Bertelli, & Sassaroli, 2011) and body dysmorphia (Fenwick & Sullivan, 2011) of EDs patients.

Alexithymia heavily influences the treatment of EDs since patients with alexithymic traits receive more antidepressants, more hospitalization, and less psychotherapy than non-alexithymic subjects (Speranza, Loas, Guilbaud, & Corcos, 2011). Difficulty in identifying feelings is a negative predictor of long-term outcome, independent of depressive symptoms and ED severity (Beales & Dolton, 2000; Speranza et al., 2005). Finally, outcome studies evidenced that alexithymia is modified by intensive treatment and related to outcome in AN (Oldershaw, Hambrook, Tchanturia, Treasure, & Schmidt, 2010) and also in BN subjects (de Groot et al., 1995).

Notwithstanding the relevance of alexithymia for EDs, two questions are still open: (1) Is some trait of alexithymia ubiquitous and necessary for the ED pathogenesis? (2) Due to its relationship with depression, eating psychopathology, and personality traits and its changes after intensive treatments, is alexithymia primary or secondary in EDs?

Some authors report that many ED subjects score in the normal range (Berthoz et al., 2007; Corcos et al., 2000; Råstam, Gillberg, Gillberg, & Johansson, 1997). Other authors interpret alexithymia as the consequence of previous unelaborated traumatic experiences and feelings of shame (Franzoni et al., 2013). These evidences make it doubtful that alexithymic traits represent core elements of EDs and not a co-occurring condition. The self-report measures of alexithymia may have underestimated the alexithymia in EDs subjects and thus cluster analysis may be useful to confirm the evidence.

The primary nature of alexithymia is supported by the evidence that high levels of alexithymia were persistent features of AN upon weight restoration (Beadle, Paradiso, Salerno, & McCormick, 2013; Parling, Mortazavi, & Ghaderi, 2010; Speranza, Loas, Wallier, & Corcos, 2007; Tchanturia et al.,

2012). Moreover, after accounting for eating disorders symptom and depression severity, some alexithymic traits remain in ED subjects (Montebarocci et al., 2006) and predict treatment outcome (Speranza et al., 2007). Nevertheless the prevalence of alexithymia in EDs is increased by depressive disorders (Leweke, Leichsenring, Kruse, & Hermes, 2012) and the level of alexithymia can be influenced by the level of depression or negative affects (Bydlowski et al., 2005; Montebarocci et al., 2006; Parling et al., 2010; Sexton, Sunday, Hurt, & Halmi, 1998). Moreover alexithymia may represent a consequence rather than a cause of starvation of AN subjects, related to depression and anxiety (Oldershaw et al., 2010; Parling et al., 2010).

At the best of our knowledge no study cross-rated the alexithymic traits of AN and BN subjects relating them with psychopathology and personality. The Temperament and Character Inventory (TCI) (Cloninger, Svrakic, & Przybeck, 1993) was widely applied to EDs with good discrimination of ED subtypes (Fassino et al., 2002) and prognostic relevance (Klump et al., 2000). To correlate personality traits, eating psychopathology, and alexithymic traits of EDs will help to understand the possible secondary roots of alexithymia (Lawson et al., 2008; Lee et al., 2010).

The present paper aims (1) to compare alexithymia features along with personality and psychopathology features between a sample of ED subjects and healthy controls; (2) to explore if two or more clusters of EDs may be grouped using alexithymia traits and to characterize them with respect to personality and psychopathology and diagnostic group, also controlling for depressive feelings; (3) to explore the relationship between alexithymia, eating psychopathology and personality traits.

Based on previous findings (Bourke et al., 1992; Corcos et al., 2000; Jimerson et al., 1994; Råstam et al., 1997) our expectation is: (1) that ED subjects display higher scores of alexithymia than healthy controls; (2) that ED subjects could be grouped in different alexithymic clusters because of different degree of alexithymia related to different personality and psychopathology characteristics (e.g. more alexithymia in subjects with borderline or depressive traits; Speranza et al., 2005, 2007). We expect almost the same cluster distribution among AN and BN subjects (Corcos et al., 2000; Råstam et al., 1997). (3) According to Lee et al. (2010) some specific personality traits could be related to alexithymic traits (e.g. display different scores in the different clusters).

2. Methods

2.1. Participants

All female patients consecutively admitted to the outpatient service of the Center for Eating Disorders of the University of Turin between June 2009 and October 2010 were considered for the study. They were evaluated by a psychiatrist, a nutritionist, and a dietician and received self-administered tests assessing personality traits, general, and eating psychopathology. ED Diagnoses were done with SCID-I and confirmed by the psychiatrist at a second visit in which he formulated the therapeutic project. They were included in the sample only female subjects with ED since the subgroup of male subjects was too small to ensure good statistical power. Exclusion criteria were: severe mental retardation, psychosis, bipolar disorder, diagnosis of Eating Disorder Not Otherwise Specified (EDNOS). Since they were only outpatients, no patient was affected with severe Major Depression, OCD or other invalidating disorders requesting inpatient admission.

2.2. Sampling

One-hundred-fifty-eight patients were diagnosed with ED full criteria; 124 successfully completed the tests battery (dropout rate 21.6%), distributed as follows: 53 with AN and 71 with BN.

The control group consisted of 80 female subjects recruited in the database of the University of Torino including male and female adult subjects with an age range from 18 to 65. For this study, we selected the subjects with female gender and the same age range of probands. The social, demographic, and clinical characteristics of the sample are shown in Table 1.

Table 1. Sociodemographic and clinical data

	AN[a]		BN[b]		HC[c]			
Clinical Data	***M***	**SD**	***M***	**SD**	***M***	**SD**	***F***	***p***
Age	24.56	8.32	28.19	8.80	23.28	0.63	10.89	<0.001
Years of study	12.38	3.08	13.17	3.38	13.00	0.00	1.80	0.167
BMI	15.75	1.62	21.96	2.47	21.95	2.46	185.38	<0.001

Notes: AN = Anorexia Nervosa; BN = Bulimia Nervosa; HC = Healthy Control.

[a]*n* = 70.

[b]*n* = 83.

[c]*n* = 80.

2.3. Materials

The initial evaluation included the application of psychometric tests, the registration of principal clinical data (height, weight, psychiatric history), and the determination of the Body Mass Index (BMI).

The self-administered tests consisted in:

TCI (Cloninger et al., 1993) 240-item self-administered questionnaire. It consists in seven dimensions. Four assess temperament (Novelty Seeking [NS], Harm Avoidance [HA], Reward Dependence [RD], and Persistence [P]). Three assess character (Self Directedness [SD], Cooperativeness [C], and Self Transcendence [ST]).

The Beck Depression Inventory (BDI) (BECK, Ward, Mendelson, Mock, & Erbaugh, 1961) worldwide known 13-item self-report measure to assess the severity of depressive symptoms.

The Symptom Check List 90 (SCL-90) (Derogatis, Lipman, & Covi, 1973) 90-item self-administered questionnaire, aimed at the evaluation of psychopathology in nine primary symptom dimensions (Somatization, Obsessive-Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Anger-Hostility, Phobic Anxiety, Paranoid Ideation, Psychoticism).

The Eating Disorders Inventory EDI-2 (Garner, 1993) 11 scales, for a total of 91 items, to assess the main psychopathological features related to EDs (Drive for Thinness, Bulimia, Body Dissatisfaction, Ineffectiveness, Perfectionism, Interpersonal Distrust, Interoceptive Awareness [IA], Maturity Fears, Asceticism, Impulse Regulation, Social Insecurity).

The TAS-20 (Bagby, Parker, & Taylor, 1994) 20-item self-report questionnaire measuring alexithymia; it assesses three scales: difficulty identifying feelings (scale #1), difficulty describing feelings (scale #2), and externally oriented (concrete) thinking (scale #3). A fourth scale is the sum of the former ones and measures the global alexithymia score. According to literature (Corcos et al., 2000; Råstam et al., 1997), the scores can be divided into three groups: alexithymic (>56), sub-alexithymic (≥44, ≤56), and non-alexithymic (<44).

2.4. Ethics

Written informed consent was obtained from all participants. Patient anonymity was preserved. The research was approved by the institutional review board of San Giovanni Battista Hospital of Torino according to the 1995 Helsinki Declaration, revised in Edinburgh in 2000.

2.5. Statistical analysis

BMI and sociodemographic characteristics were compared between clinical (AN and BN) and control groups using ANOVA for continuous variables and chi-square test for categorical variables.

Alexithymia, personality, and eating psychopathology traits were compared between clinical (AN and BN) and control groups with ANCOVA, using in a first step the clinical characteristics which differed between groups as confounding factors, and then also the depression measures (BDI and SCL-90 scores) as confounding factors.

To test the relationship of alexithymia with personality or psychopathology traits a linear regression analysis was performed using age, and personality, eating, and general psychopathology scores which resulted different from controls as dependent variables, and alexithymia scores as independent variables.

To test if any of the TAS-20 scales was ubiquitous among ED patients the ED group was considered as a whole, and a two-step cluster analysis using the TAS-20 scores was performed to identify two or more subgroups of EDs subjects (with a limit of 15 clusters), based on their alexithymia characteristics, regardless of the ED diagnosis.

Personality and psychopathology scores were compared between clusters and with healthy controls using the ANCOVA, using age and BMI as confounding factors. The composition of each cluster with respect to AN/BN diagnosis was tested with chi-square test.

The ANCOVA of alexithymia traits among the diagnostic groups was also explored using personality and psychopathology traits as covariates to evidence the specific role of each trait in producing the variance of alexithymia traits.

The amount of variables explored in the present study suggested the application of a measure to reduce Type II errors, since the present is an explorative study it was applied a conservative correction with $p < 0.01$. All analyses were performed with the SPSS 17.0.0 (2008).

3. Results

3.1. Clinical and sociodemographic characteristics

BMI was significantly lower in AN group with respect to both BN (BMI = 22.0 ± 2.5) and control groups ($p < 0.001$). Age was significantly higher in BN group with respect to AN and control groups ($p < 0.001$). No significant difference was observed as concerns years of education or geographical origin (Table 1).

3.2. ANCOVA between AN, BN and control groups

Table 2 displays the results of the ANCOVA controlled for age between the three diagnostic groups. Both anorectic and bulimic subjects display higher scores than controls in difficulty in identifying and describing feelings and in the total TAS-20 score.

The ANCOVA with depression measures as confounding factors evidenced that the differences in some characteristics of personality, in general and eating psychopathology and in identifying feelings were independent from depressive feelings (Table 3).

Applying the linear correlation analysis in the whole sample of ED subjects using the TAS-20 scores as independent variables the difficulty in describing feelings correlated with SD (B = −0.500; $t = -4.499$; $p < 0.001$) and IA (B = 0.115; $t = 2.672$; $p < 0.001$); while the TAS-20 total scale correlated with SD (B = −0.222; $t = -7.401$; $p < 0.001$) and IA (B = −0.229; $t = -12.114$; $p < 0.001$).

3.3. Cluster analysis

The procedure yielded two clusters, with no case exclusion. The first cluster was composed of 40/124 subjects (32.3%) and named Non-Alexithymic Cluster (NAC), the second cluster was composed of 84/124 subjects (67.7%) and named Alexithymic Cluster (ALC), both were mixed with anorectic and bulimic diagnoses. Table 4 displays TAS-20 scores of each cluster.

Table 2. ANOVA and ANCOVA for EDs subjects and controls corrected for age and BMI

Measures	AN[a]		BN[b]		HC[c]		ANOVA		ANCOVA	
	A		B		C					
	M	SD	*M*	SD	*M*	SD	*F*	Post-hoc	*F*	Post-hoc
BMI	15.75	1.62	21.95	2.47	21.94	2.45	185.38**	A < B,C		
TCI										
Novelty seeking	19.93	5.43	22.38	6.16	18.36	5.56	9.73**	C < B A < B	9.21**	C < B
Harm avoidance	21.53	6.62	22.41	7.81	17.29	6.67	11.45**	C < A,B	12.27**	C < B
Persistence	5.27	1.95	4.33	1.96	4.78	1.87	3.84*	B < A	3.88*	B < A
Self-directiveness	23.71	8.95	19.49	8.63	32.80	6.86	55.22**	C > A,B A > B	55.52**	C > A,B
Cooperativeness	29.73	7.96	29.47	8.35	32.00	5.83	–	C > B	3.15*	C > B
Self-transcendence	13.71	7.01	12.27	5.90	9.65	5.31	8.08**	C < A,B B < A	10.43**	C < A,B B < A
EDI-2										
Drive for thinness	11.62	7.61	14.94	5.56	2.04	3.68	111.39**	C < A,B A < B	105.09**	C < A,B
Bulimia	3.33	5.13	11.77	5.91	1.08	2.22	113.77**	C < A,B A < B	99.57**	C < A,B A < B
Body dissatisfaction	11.58	6.96	17.69	7.57	5.03	6.09	66.80**	C < A,B A < B	77.62**	C < A,B
Ineffectiveness	8.18	6.54	11.69	7.94	1.65	2.37	56.28**	C < A,B A < B	57.23**	C < A,B A < B
Perfectionism	4.53	3.60	5.79	4.44	3.11	2.90	10.32**	C < B	9.16**	C < B
Interpersonal distrust	5.24	4.80	6.86	5.31	2.33	2.37	22.58**	C < A,B	24.85**	C < A,B
Interoceptive awareness	9.42	6.42	10.55	6.38	0.74	1.32	83.89**	C < A,B	74.95**	C < A,B
Maturity fears	6.89	4.89	6.46	6.15	4.22	3.90	5.76*	C < A,B	5.93*	C < B
Ascetism	6.67	4.08	7.54	4.13	2.73	1.86	42.77**	C < A,B	43.56**	C < A,B
Impulse regulation	6.35	6.05	7.14	6.31	1.01	1.70	33.83**	C < A,B	32.04**	C < A,B
Social insecurity	6.93	4.59	8.69	6.17	2.11	2.57	41.34**	C < A,B	43.95**	C < A,B A < B
BDI	12.78	8.56	14.53	8.12	2.29	2.51	73.08**	C < A,B	68.31**	C < A,B
SCL-90										
Somatization	19.40	11.78	18.95	10.08	7.58	5.23	40.07**	C < A,B	26.08**	C < A,B
Obsessive-compulsive	16.38	9.27	20.14	8.04	6.79	4.75	68.51**	C < A,B A < B	63.67**	C < A,B A < B
Interpersonal sensitivity	16.08	8.32	17.44	8.48	5.70	3.77	63.46**	C < A,B	59.06**	C < A,B
Depression	25.11	12.61	28.37	11.29	7.59	5.40	97.58**	C < A,B	79.28**	C < A,B
Anxiety	17.09	10.35	17.29	8.83	5.68	3.95	53.67**	C < A,B	40.09**	C < A,B
Anger-hostility	8.34	6.05	8.04	5.13	2.91	2.61	31.88**	C < A,B	29.28**	C < A,B
Phobic anxiety	5.94	6.40	6.68	6.48	1.10	2.02	25.62**	C < A,B	22.37**	C < A,B
Paranoid ideation	8.72	4.84	11.01	9.46	3.29	2.21	30.10**	C < A,B	24.94**	C < A,B
Psychoticism	10.87	7.71	15.55	30.03	2.20	2.58	10.25**	C < A,B	10.49**	C < B
Total	139.19	72.31	150.22	65.40	46.86	26.33	77.60**	C < A,B	63.07**	C < A,B
TAS										
Difficulty identifying feelings	21.57	7.16	21.20	6.51	11.36	4.20	69.44**	C < A,B	64.08**	C < A,B
Difficulty describing feelings	16.02	5.19	16.18	5.95	12.29	4.38	13.24**	C < A,B	13.56**	C < A,B
Total	56.13	12.94	54.13	14.61	40.86	8.87	32.99**	C < A,B	30.24**	C < A,B

Notes: NAC = Not Alexithymic Cluster; ALC = Alexithymic Cluster; HC = Healthy Control; BMI = Body Max Index; TCI = Temperament and Character Inventory; EDI-II = Eating Disorders Inventory-II; BDI = Beck Depression Inventory; SCL-90 = Symptom Check List-90; TAS = Toronto Alexithymia Scale.

[a]$n = 70$.

[b]$n = 83$.

[c]$n = 80$.

*$p < 0.05$.

**$p < 0.001$.

Table 3. ANCOVA of EDs subjects and controls corrected for BDI and SCL-90 depression

Measures	NAC[a]		ALC[b]		HC[c]		*F*	Post-hoc
	A		B		C			
	M	SD	*M*	SD	*M*	SD		
BMI	15.75	1.62	21.95	2.47	21.94	2.45	118.85**	C > B > A
TCI								
Novelty seeking	19.93	5.43	22.38	6.16	18.36	5.56	5.96*	C < B A < B
Persistence	5.27	1.95	4.33	1.96	4.78	1.87	3.43*	A > B
Self directiveness	23.71	8.95	19.49	8.63	32.80	6.86	4.44*	C > B A > B
EDI-2								
Drive for thinness	11.62	7.61	14.94	5.56	2.04	3.68	30.98**	C < A,B A < B
Bulimia	3.33	5.13	11.77	5.91	1.08	2.22	59.43**	C < B A < B
Body dissatisfaction	11.58	6.96	17.69	7.57	5.03	6.09	17.58**	C < B A < B
Interoceptive awareness	9.42	6.42	10.55	6.38	0.74	1.32	12.65**	C < A,B
SCL-90								
Obsessive-compulsive	16.38	9.27	20.14	8.04	6.79	4.75	4.62*	B > A,C
Anxiety	17.09	10.35	17.29	8.83	5.68	3.95	3.35*	C < A,B
TAS								
Difficultyidentifying feelings	21.57	7.16	21.20	6.51	11.36	4.20	5.10*	C < A

Notes: NAC = Not Alexithymic Cluster; ALC = Alexithymic Cluster; HC = Healthy Control; BMI = Body Max Index; TCI = Temperament and Character Inventory; EDI-II = Eating Disorders Inventory-II; BDI = Beck Depression Inventory; SCL-90 = Symptom Check List-90; TAS = Toronto Alexithymia Scale.

[a]$n = 40$.

[b]$n = 84$.

[c]$n = 80$.

*$p < 0.05$.

**$p < 0.001$.

Table 4 displays the differences between clusters and controls with respect to alexithymia, personality, and psychopathology features controlled for age and BMI. In general these features are more pathologic in the ALC than in the NAC than in control group with a progression. Nevertheless as concerns personality NS and ST are significantly higher than in controls only in the ALC group. On the other hand, both the NAC and the controls are lower in HA, interpersonal distrust, maturity fears, difficulty in describing feelings and in total TAS-20 score.

Table 5 displays the cluster composition with respect to the ED diagnosis. Diagnostic distribution was not significantly different in the clusters (chi-square = 0.025; $p < 0.876$).

Table 6 displays the differences between clusters and controls with respect to alexithymia traits when personality and psychopathology features are used as covariates into the ANCOVA. Self-directedness, interoceptive awareness, depression, BMI, and diagnostic subtypes significantly and differently accounted for the cluster differences in TAS-20 scores.

4. Discussion

The present paper tests the hypotheses that alexithymia is a continuous and transversal characteristic among ED subjects and that personality dimensions and psychopathology features are related and primary with respect to alexithymia.

Table 4. ANCOVA between ED clusters and controls

Measures	NAC[a]		ALC[b]		HC[c]		*F**	Post-hoc
	A		B		C			
	M	SD	*M*	SD	*M*	SD		
Age	29.75	10.24	25.29	7.89	23.28	0.69	10.68	B,C < A
BMI	19.44	3.59	19.40	3.63	21.95	2.46	14.31	A,B < C
TCI								
Novelty seeking	20.60	6.22	21.76	5.91	18.36	5.56	7.02	C < B
Harm avoidance	17.55	7.22	24.22	6.21	17.29	6.67	26.15	A,C < B
Self-directiveness	27.25	8.75	18.70	7.36	32.80	6.87	71.19	B < A < C
Self-transcendence	12.35	6.28	12.90	6.23	9.65	5.31	7.43	C < B
EDI-2								
Drive for thinness	11.58	7.72	14.44	6.01	2.04	3.68	99.04	C < A < B
Bulimia	6.18	6.50	9.22	7.11	1.08	2.23	41.03	C < A < B
Body dissatisfaction	12.93	7.99	16.09	7.56	5.03	6.09	49.49	C < A,B
Ineffectiveness	5.28	4.91	12.17	7.26	1.65	2.38	79.09	< A < B
Perfectionism	4.83	3.99	5.29	3.97	3.11	2.91	6.89	C < A,B
Interpersonal distrust	3.38	4.57	7.43	4.77	2.33	2.37	36.10	A,C < B
Interoceptive awareness	5.28	4.05	12.46	6.15	0.74	1.33	143.98	C < A < B
Maturity fears	4.28	4.69	7.27	5.53	4.23	3.90	9.74	A,C < B
Ascetism	5.03	3.31	7.9	4.06	2.73	1.87	53.00	C < A < B
Impulse regulation	3.15	3.77	8.07	6.21	1.01	1.70	53.16	C < A < B
Social insecurity	4.63	5.31	9.23	4.82	2.11	2.57	59.40	C < A < B
BDI	9.15	7.21	15.75	7.67	2.29	2.52	98.21	C < A < B
SCL-90								
Somatization	14.69	9.00	20.64	10.66	7.58	5.24	45.04	C < A < B
Obsessive-compulsive	13.59	7.62	20.27	8.02	6.79	4.75	76.80	C < A < B
Interpersonal sensitivity	11.92	7.65	18.76	7.73	5.70	3.78	84.29	C < A < B
Depression	18.90	9.88	30.07	10.75	7.59	5.41	128.10	C < A < B
Anxiety	12.03	7.99	19.25	9.04	5.68	3.95	70.35	C < A < B
Anger-hostility	5.67	4.23	8.89	5.59	2.91	2.61	39.86	C < A < B
Phobic anxiety	3.56	4.53	7.25	6.55	1.10	2.03	32.77	C < A < B
Psychoticism	13.54	42.05	13.52	7.92	2.20	2.59	8.97	C < A,B
Paranoid ideation	8.97	12.26	10.13	4.93	3.29	2.22	23.33	C < A,B
Total	97.67	48.76	164.11	63.48	46.86	26.34	114.78	C < A < B
TAS								
Difficulty identifying feelings	14.35	4.43	24.69	4.88	11.36	4.20	188.22	C < A < B
Difficulty describing feelings	12.15	6.71	18.00	3.81	12.29	6.71	36.77	A,C < B
Total	39.88	11.29	62.18	8.03	40.86	8.88	140.75	A,C < B

Notes: NAC = Not Alexithymic Cluster; ALC = Alexithymic Cluster; HC = Healthy Control; BMI = Body Max Index; TCI = Temperament and Character Inventory; EDI-II = Eating Disorders Inventory-II; BDI = Beck Depression Inventory; SCL-90 = Symptom Check List-90; TAS = Toronto Alexithymia Scale.

[a]*n* = 40.

[b]*n* = 84.

[c]*n* = 80.

*All results are significant with $p < 0.001$.

Table 5. Cluster distribution among anorexia and bulimia diagnoses

Alexithymia clusters	AN	BN	Total
Not alexithymic cluster	18 (45%)	22 (55%)	40 (100%)
Alexithymic cluster	35 (42%)	49 (58%)	84 (100%)
Total	53 (43%)	71 (57%)	124 (100%)

Notes: AN = Anorexia Nervosa; BN = Bulimia Nervosa.

Table 6. ANCOVA of TAS Scales in ALC, NAC, and controls using personality and psychopathology as covariants

	TAS-20 Scale #1		TAS-20 Scale #2		TAS-20 Scale #3		TAS-20 Total scale	
Measures	***F***	***p***	***F***	***p***	***F***	***p***	***F***	***p***
Self-directedness (TCI)	3.35	0.069	4.37	0.038	10.28	0.002	2.62	0.107
Interoceptive awareness (TCI)	26.55	0.000	0.96	0.326	0.87	0.352	12.16	0.001
Depression (SCL-90)	15.76	0.000	0.070	0.782	12.55	0.000	16.38	0.000
BDI	2.04	0.154	4.13	0.044	11.74	0.001	0.000	0.955
Diagnosis	2.11	0.124	0.120	0.886	0.020	0.974	2.49	0.085
	$R^2 = 0.685$		$R^2 = 0.259$		$R^2 = 0.174$		$R^2 = 0.492$	

Notes: TAS = Toronto Alexithymia Scale; TCI = Temperament and Character Inventory; BDI = Beck Depression Inventory; SCL-90 = Symptom check list-90.

Both anorectic and bulimic subjects display similar levels of alexithymia which are higher with respect to those of control subjects. This substantially confirms previous evidences on alexithymia in eating disorders (Berthoz et al., 2007; Corcos et al., 2000; Lawson et al., 2008).

4.1. Clusters found

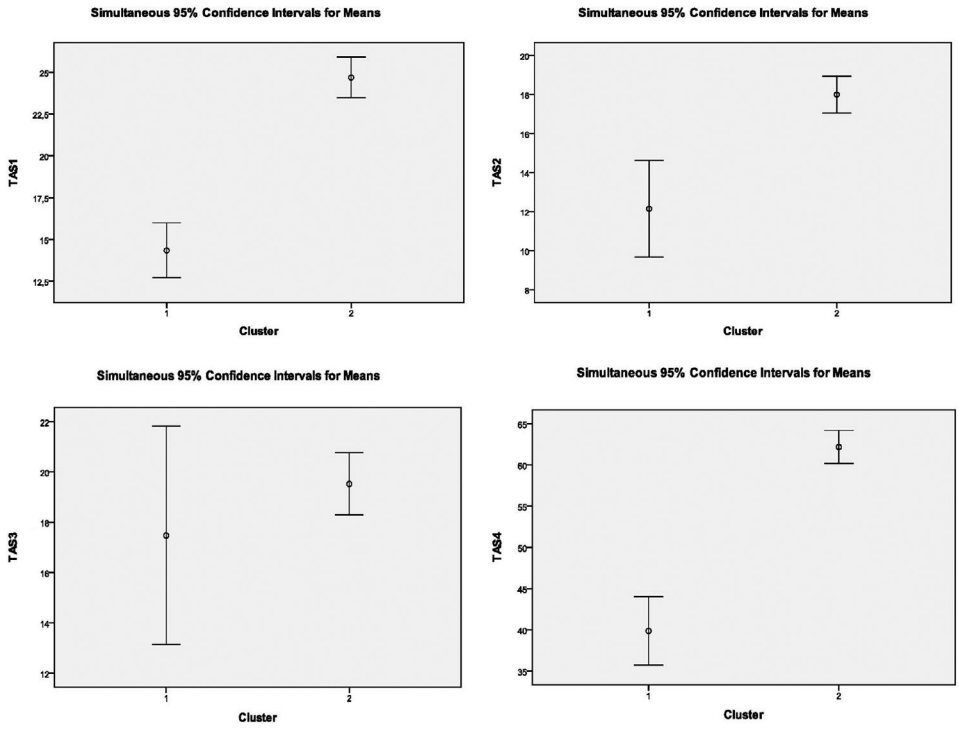
Cluster analysis evidences two clusters of ED subjects. As evidenced by the plots (Figure 1), the difficulty in identifying and expressing feelings and the global TAS-20 score clearly distinguish the two clusters. The largest cluster (68% of the sample) displays significantly higher scores in the first two scales, and a total score which is in the pathologic range (Bagby et al., 1994; Råstam et al., 1997), with the concrete thinking scale at the upper side. It can be considered the ALC. The other displays low scores except for difficulty in expressing feelings, with a total score in the normal range (Bagby et al., 1994; Råstam et al., 1997), so it can be considered poorly or not alexithymic cluster (NAC).

According to previous literature (Franzoni et al., 2013; de Groot et al., 1995; Råstam et al., 1997) alexithymia as measured by TAS-20 total score does not result a pervasive trait in anorexia and bulimia. Nevertheless the present findings suggest that the difficulty in identifying feelings is a pervasive feature in EDs. It may thus represent a core risk factor for ED development. In fact it may support the psychosomatic mechanisms of feeling expression which are typical of these disorders (Halmi, 2005).

Nevertheless the nature of the difficulty in identifying feelings deserves further exploration since it may be consequent either to ED clinical conditions (Oldershaw et al., 2010), personality features (Beales & Dolton, 2000; Lee et al., 2010), depression (Bydlowski et al., 2005; Montebarocci et al., 2006; Parling et al., 2010; Sexton et al., 1998), or to disconfirming family dynamics as supposed by Minuchin et al. (1978) and other authors (Amianto, Daga, Bertorello, & Fassino, 2013; Fassino, Amianto, & Abbate-Daga, 2009; Fassino, Amianto, Rocca, & Abbate Daga, 2010).

Figure 1. TAS scores and ED subjects clusters.

Notes: The figure displays the cluster distributions of the TAS scores. The Difficulty in Identifying (TAS1) and in Describing Feelings (TAS2) and the global score of the TAS-20 (TAS4) clearly distinguish two groups of subjects with no overlap between each other. Also the Externally Oriented Thinking (TAS3) displays that the scores of the second cluster are all concentrated on the upper third.



4.2. Clusters characteristics

The ALC displays extreme pathologic personality and psychopathology profiles with respect to the NAC, which is intermediate with respect to controls. ALC displays higher NS and HA, lower SD and C, but higher ST than controls. It also displays higher HA and lower ST than the NAC group. ED alexithymic subjects are thus a sub-population of weaker, personality-disturbed individuals prone to depression, anxiety, and other psychopathological reactions to stressful stimuli because of their temperament vulnerability (Fassino, Amianto, Sobrero, & Abbate Daga, 2013; Miettunen & Raevuori, 2012) in addition to their character immaturity (Cloninger et al., 1993; Svrakic et al., 2002). The ALC subpopulation of ED subjects displays a high degree of interpersonal malfunctioning due to low cooperativeness which is typical of cluster B personality disorders (Cloninger et al., 1993; Fassino et al., 2009; Svrakic et al., 2002). Thus it is consistent with a relationship of alexithymia with immature or narcissistic traits (Lawson, Emanuelli, Sines, & Waller, 2008; Lee et al., 2010), lower educational level and cognitive skills (Carano et al., 2006; Oldershaw et al., 2010), and childhood traumatic experiences (Groleau et al., 2012). Moreover alexithymia is related to a higher degree of psychopathology more than to BMI, according to some literature findings (Fassino, Abbate Daga, Pierò, & Rovera, 2002; Fassino et al., 2002). Alexithymia is thus related to eating and general psychopathology (Carano et al., 2006; Speranza et al., 2007, 2011), but overall with underlying cluster B personality disorders. This partially justifies clinical evidences on the need of more intensive treatments, non-specific for eating disorders (i.e. antidepressants and inpatient treatment), in the more alexithymic ED subjects (Speranza et al., 2011).

The distribution of alexithymia between AN and BN diagnoses is balanced (Corcos et al., 2000; Råstam et al., 1997) even though some literature findings evidenced more difficulties in emotion recognition among subjects with AN (Gilboa-Schechtman, Avnon, Zubery, & Jeczmien, 2006). This evidence contrasts with the evidences on BED subjects (Carano et al., 2006) suggesting a different psychopathological mechanisms relating alexithymia to these disorders.

4.3. Influence of depression, personality, and psychopathology traits on alexithymia

The role of depression in alexithymia-based clustering is strong confirming the relationship between the two constructs (Bydlowski et al., 2005; Leweke et al., 2012; Montebarocci et al., 2006; Parling et al., 2010; Sexton et al., 1998). Nevertheless personality and psychopathology correlates are more strictly related to depressive feelings than to alexithymia (Montebarocci et al., 2006). And this supports the hypothesis, to be tested in further exploration, that personality disorders are mediators of the relationship between alexithymia and depression. On the other hand difficulty in identifying feelings, independently from depression, represents a risk factor for EDs development in non-personality-disordered subjects, so it could be the primary alexithymic trait in ED subjects.

Difficulty in identifying feelings measured by the TAS-20 is strongly related with SD and EDI-2 interoceptive awareness, so it may represent the convergence of character immaturity and poor interoceptive awareness. IA is generally interpreted as an eating psychopathology trait, nevertheless it is possible that it represents a transmittable (Walter, Montag, Markett, & Reuter, 2011) biologic trait pervasive in ED family members (Minuchin et al., 1978; Rozenstein, Latzer, Stein, & Eviatar, 2011), as a possible endophenotype of eating disorders (Fassino, Pierò, Gramaglia, & Abbate Daga, 2004).

Alternatively, this trait may be related to the development of brain emotional-verbal connections (D'Agata et al., 2015; Gündel et al., 2004; Kano, Ito, & Fukudo, 2011). In fact it improves with treatment (de Groot et al., 1995; Lawson et al., 2008; Oldershaw et al., 2010). Since the present is a cross-sectional study the meaning of the association between alexithymic traits and SD and IA needs to be further explored. In fact primitive problems in identifying or describing feelings may have impaired character development. Conversely, character immaturity may produce a poor ability to describe feelings and emotions (Widiger, 2011). Moreover difficulty in identifying feelings may be related to inadequate attachment (Picardi, Toni, & Caroppo, 2005), and/or active inhibition or inadequate stimulation of emotional expression in the family environment (Espina, 2003; Guttman & Laporte, 2000) as evidenced for IA (Fassino et al., 2010; Minuchin et al., 1978; Oldershaw et al., 2010; Turner, Rose, & Cooper, 2005).

Neuroimaging and genetics should be applied to explore biological constructs of difficulty in identifying feelings and its relationship with individuals' personality development (Parling et al., 2010). Future research should also ascertain if the difficulty in identifying feelings evidenced as a "core" in ED subjects and related to IA and SD impairment corresponds to the same alexithymia trait evidenced in other mental disorders (D'Agata et al., 2015; Subic-Wrana et al., 2010).

5. Conclusion

The present study suggests that the difficulty in expressing feelings is an ubiquitous dimension of alexithymia in subjects with an ED. Only this trait, and not alexithymia in general, is ubiquitous in ED subjects. Nevertheless it is strongly related to character development (SD) and to eating (interoceptive awareness) and depressive psychopathology, so possibly it is not a primary trait.

This supports the psychosomatic mechanism as a pathogenic move to the outburst of these disorders (Gulliksen et al., 2012; Halmi, 2005; Minuchin et al., 1978). Nevertheless alexithymia is more related to severe personality malfunctioning and low character development than to eating disorders diagnosis (Beales & Dolton, 2000; Lee et al., 2010). This suggests that alexithymia complicates the course of EDs, possibly also because it correlates with co-occurring personality disorders (Speranza et al., 2005, 2007).

Further studies are thus needed to produce a more in-depth knowledge of the underlying biological nature this trait and its relationship with the other traits. This is needed also because recent evidences suggest that they could be different also among subjects with AN and BN (D'Agata et al., 2015).

6. Clinical implications

The early recognition and therapeutic approach to alexithymic traits as far as disordered personality traits in ED subjects is of relevance. These traits contribute to unfavorable phenomena affecting therapeutic course of EDs: from the dropout form care (Fassino, Abbate Daga, Pier, et al., 2002), to resistances to treatment (Abbate-Daga, Amianto, Delsedime, De-Bacco, & Fassino, 2014; Nordbø, Espeset, Gulliksen, Skårderud, & Holte, 2006; Nordbø et al., 2008), to disorders of affect regulation (Storch, Keller, Weber, Spindler, & Milos, 2011), and thus they represent relevant problem from the clinical and also economical points of view (Kaye, Fudge, & Paulus, 2009; Vitousek & Watson, 1998). Specific therapeutic approaches to alexithymia (Lawson et al., 2008; Oldershaw et al., 2010) integrated with treatments currently available for personality development and depressive psychopathology (Flament et al., 2012; Treasure, Claudino, & Zucker, 2010) may avoid the vicious circle between personality characteristics, depressive psychopathology and IA which produces alexithymia (Abbate-Daga et al., 2011; Wagner et al., 2007; Widiger, 2011).

More specifically, the present study suggests that difficulty in expressing feelings can be considered a risk factor for the outburst of EDs, in particular in non-personality-disordered subjects. Psychological therapy should consider a specific approach to this trait as basic for both for AN and BN subjects (de Groot et al., 1995; Oldershaw et al., 2010). The exploration of the neural underpinnings of the difficulty in identifying feelings may give the rationale for new biological therapies, such as Transcranial Magnetic Stimulation (TMS), in eating disorders (D'Agata et al., 2015; Van den Eynde, Claudino, Campbell, & Schmidt, 2011).

7. Limitations and research perspectives

The present study was carried on with a relatively small sample. Further studies with larger samples should explore the ED subtypes and other ED diagnosis such as BED or ED NOS. It could be also of interest the exploration of male subjects affected with ED since they are not included in the present sample. Personality assessment was carried on with a self-administered instrument which could be hampered by the alexithymic traits, further studies should encompass clinical assessment of Personality Disorders. Future research are needed to verify if the difficulty in expressing feelings corresponds to the interoceptive awareness, and if it may represent a specific endophenotype for EDs. Objective measures should be built to assess it. Functional neuroimaging should be applied for the exploration of the neural core of alexithymia. Finally, further research is needed to ascertain the family role in the transmission of this feature.

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