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Boredom, alexithymia, and desire thinking in eating disorders: a cross-sectional study

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Abstract

Background: Eating disorders (ED) can be considered in terms of affective disorders. In this perspective, abnormal eating behaviors would be dysfunctional defensive behaviors related to difficulties to recognize and modulate traumatic emotional experiences. The aim of this study is to explore the associations between alexithymia, boredom, impulsiveness, and desire thinking in subjects with eating disorders.

Methods: 45 patients with ED and 45 healthy controls completed the following questionnaires: Toronto Alexithymia Scale, Barratt Impulsiveness Scale, Multidimensional State Boredom Scale, Desire Thinking Questionnaire, Body Uneasiness Test and Somatoform Dissociation Questionnaire.

Results: Our results seem to confirm that alexithymia, boredom, impulsivity, and desire thinking are strictly related in ED. In particular, difficulties in identifying feelings contribute to determine boredom experiences which, in turn, contribute significantly to structure body image disorders.

Conclusions: This study adds new insights into the associations between alexithymia, boredom, impulsiveness, and desire thinking in subjects with eating disorders. Future areas of investigation could better explore the role of boredom experiences in structuring body image dissatisfaction and its relationship with alexithymia.

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1. Introduction

According to many researchers, eating disorders (anorexia, bulimia, binge eating, etc.) are characterized by persistence disturbances of eating-related behaviors associated with a bio-psycho-social etiology. From a neurobiological point of view, there are pieces of evidence about an alteration of monoamine systems of serotonin (5-HT) and dopamine (DA) involved in eating

disorders (Avena & Bocarsly, 2012; Avena et al., 2009; Fava et al., 1989). Recently, Vicario et al. (2017) have underlined the presence of significant interrelationships among dopaminergic and serotonergic dysfunctions, particularly in striatal circuits, abnormal reward processing, abnormal food ingestion and dysregulated disgust processing (in the specific, disgust sensitivity for food, self-disgust, and disgust for human body products) in eating disorders. Alterations of serotonin and dopamine have been found in rapport with inflammatory markers in patients with an eating disorder (Kaye et al., 2005). Some studies have stressed a significant role of immune-mediated mechanism in the development of eating disorders: in the specific, it has been observed activation of the immune system with increased levels of pro-inflammatory cytokines, which provoke a stimulation of the HPA axis and neurotransmission via the autonomic nervous system (Corcos et al., 2003). The same processing has been found in other mental disorders: depression, anxiety, personality disorder as borderline personality disorders, schizophrenia, PTSD (Kahl et al., 2006; Momtazmanesh et al., 2019; Schwarz, 2003; Yang & Jiang, 2020).

According to the Adverse Childhood Experiences (ACE) model, there is a significant association between emotional and relational trauma and eating disorders (Guillaume et al., 2016). Adam and Epel (2007) found an interaction between the hypothalamic-pituitary-adrenal (HPA), the brain reward circuitry, traumatic stresses, and eating disorders. According to an emotional perspective, this association could be mediated by negative emotions, such as depression, anxiety, anger, shame, disgust, and boredom (Schneider et al., 2010).

Caretti, Craparo, and Schimmenti (2010) consider eating disorders in terms of affective disorders. According to them, abnormal eating behaviors would be dysfunctional defensive behaviors related to difficulties to recognize and modulate traumatic emotional experiences: in the specific, these authors have a sound that traumatic shame has a fundamental role for the onset of eating disorders and distorted body representations.

The literature on eating disorders is in agreement in distinguishing two different levels of the internal representations of the body (Cash & Deagle, 1997). The body image is a multidimensional construct and is defined as the cognitive representation of the person about his own body including feelings and thoughts that result from this representation (Irvine et al., 2019). The body schema, instead, is a spatial representation of the body of which the subject is generally unaware and which is continuously updated through proprioceptive input, thus allowing the control of movements (de Vignemont, 2010; Dijkerman & de Haan, 2007). According to recent studies, individuals with eating disorders show distortions in both the body image and body schema (Irvine et al., 2019). More specifically, the mechanism underlying these distortions would be the difficulty in integrating sensory inputs which results in a distorted long-term representation of the body with a significant impact on the emotional/affective level (Irvine et al., 2019; Pitron & de Vignemont, 2017).

Previous research demonstrated interactions between body image and affective states. In this regard, alexithymia, that is characterized by the difficulty in identifying and describing feelings and by concrete and externally oriented thinking, seems to play an important role in the perception of an adverse body image (Franzoni et al., 2013). However, the presence of other factors mediating the relationship between affective dysregulation and body image disorders has been hypothesized (Hund & Espelage, 2006; Taylor et al., 1996).

Other studies investigated the role of boredom. This construct is defined as an emotion associated with feelings of dissatisfaction, restlessness, low attention and lack of interest (Moynihan et al., 2015; van Tilburg & Igou, 2011). Boredom has been correlated with several eating disorders (Ganley, 1989). Indeed, food can be used as a mean to escape boredom, especially in the case of obesity (Moynihan et al., 2015). Crockett, Myhre and Rokke (2015) confirm that boredom can be predictive of maladaptive eating behaviors.

Finally, desire thinking, defined as a voluntary thinking process involving the elaboration of a desired target at a verbal and imaginary level, has been shown to predict negative affect and irrational food beliefs in subjects with binge eating disorder (Caselli & Spada, 2010). Similarly, impulsivity is another important variable implicated in eating disorders (Lavender & Mitchell, 2015). It is defined as the difficulty in controlling thoughts and behavior (Barratt, 1993; Fossati et al., 2001) and play an important role especially in bulimic-spectrum disorders that are generally characterized by an impulsive nature (i.e., binge eating and purging) (Lavender & Mitchell, 2015).

1.1 Study Hypotheses

This study aimed to explore the associations among alexithymia, boredom, impulsiveness, and desire thinking in subjects with eating disorders. More specifically, we hypothesized a strong relationship between affective dysregulation and body image disorders. Furthermore, we explored also other variables that can play a significant role in the maintenance of eating disorders: impulsiveness, boredom, and desire thinking.

2. Materials and Methods

2.1 Participants

45 subjects with ED (average age: 24.07 ± 8.25 years) and 45 healthy control (HC) participants (average age: 26 ± 7.04 years) were enrolled for this study. Most of the sample was female (86.7% versus 13.3% males).

Participants with ED were selected in a special sanitary treatment center for eating disorders (Casa di cura “Villa Miralago”, Varese, Italy) Inclusion criteria were to have a diagnosis of ED as described in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) and the presence of the disorder for at least 6 months. Subjects with addiction and

psychotic disorders were excluded from the sample. The diagnosis was performed after a full psychiatric and psychological evaluation.

HC participants were enrolled at the Kore University of Enna. Inclusion criteria consisted of not having a current or past history of eating disorders and having a BMI between 18.5 and 24.9 kg/m² that indicates a normal weight according to the World Health Organization (WHO) classification.

2.2 Procedures

The study was designed following the Helsinki Declaration, conforms to the Committee on Publication Ethics (COPE) guidelines. All the design, analysis, interpretation of data, drafting and revisions followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement: guidelines for reporting observational studies, available through the EQUATOR (Enhancing the QUALity and Transparency Of health Research) network. The study was approved by the Institutional Review Board of the Kore University of Enna. Before the administration, participants were informed of the general purpose of the study and provided a valid informed consent. Participation was strictly voluntary with no remuneration, and the protocols were anonymous.

2.3 Measures

Six psychological self-report questionnaires were administered to the participants:

Toronto Alexithymia Scale – 20 (TAS-20) – The TAS-20 is a 20-item questionnaire and is the most common tool for the assessment of alexithymia (Bagby et al., 1994). Each item is graded according to a five-point Likert-type scale ranging from 1 = “strongly disagree” to 5 = “strongly agree”. Total scores range from 20 to 100 with a score ≥ 61 indicative of alexithymia and scores between 51 and 60 of borderline alexithymia. The TAS-20 is made up of three factors: F1, difficulty in identifying feelings; F2, difficulty in describing feelings to others; F3, externally oriented thinking style. The internal consistency of the Italian version of the questionnaire is good (Cronbach’s alpha = .81), and has the same three-factor structure of the original English version (Bressi et al., 1996; Caretti & Barbera, 2005).

Barratt Impulsiveness Scale-11 (BIS-11) – The BIS-11 is a 30-item instrument designed for the assessment of impulsiveness (Barratt, 1959). All items are answered on a four-point scale ranging from 1 = “rarely/never” to 5 = “almost always/always”. The BIS-11 has a multidimensional structure with three main dimensions of impulsive behavior: attentional (a lack of focus on the ongoing task), motor (acting without thinking), and non-planning impulsivity (orientation to the present rather than to the future). Although Patton et al. (1995) also reported six first-order factors (attention, cognitive instability, motor, perseverance, self-control, and cognitive complexity), most studies focused on the three second-order factors

(Stanford et al., 2009). The Italian version of the BIS-11 (Fossati et al., 2001) shows good psychometric properties (Cronbach's alpha = .79).

Multidimensional State Boredom Scale (MSBS)- The MSBS is composed of 29 items and it is one of the most used instrument for the assessment of boredom experiences (Fahlman et al., 2013). It has a five-factor structure: Disengagement, High Arousal, Low Arousal, Inattention, and Time Perception. The questionnaire shows good psychometric properties (Fahlman et al., 2013) and has been validated in several languages (Alda et al., 2015; Craparo et al., 2017; Ng et al., 2015). The Italian adaptation of the MSBS (Craparo et al., 2017) has a good internal consistency (Cronbach's alpha = .95).

Desire Thinking Questionnaire (DTQ) – The DTQ is a self-report measure aimed at assessing both verbal and imaginal components of desire thinking (Caselli & Spada, 2011). The questionnaire is composed of 10 items on a 4-point Likert-type scale (“Almost never”, “Sometimes”, “Often”, “Almost always”). It consists of two factors: Verbal Perseveration, that is the verbal component of desire thinking, and Imaginal Prefiguration, that is the imaginative component of desire thinking. Higher scores are indicative of higher levels of desire thinking. The Italian version of this instrument shows good psychometric properties (Cronbach's alpha = .83), as well as divergent and predictive validity (Caselli & Spada, 2011).

Body Uneasiness Test (BUT) – The BUT is a self-rated scale assessing several areas of body image disorders and related psychopathologies. It consists of 71 items and two parts: BUT-A, which evaluates weight phobia, body image concerns, avoidance, compulsive self-monitoring, detachment and estrangement feelings towards one's own body (depersonalization); and BUT-B, which assesses specific concerns regarding particular body parts or functions (Cuzzolaro et al., 2006). The total mean score of all items of the BUT-A (Global Severity Index [BUT-GSI]) and the number of body parts or functions that the participant reported disliking on the BUT-B subscales (Positive Symptom Total [BUT-PST]) were evaluated. Higher scores are indicative of greater body uneasiness. The Italian version shows good psychometric properties (Cronbach's alpha ranging between 0.64 and 0.89).

Somatoform Dissociation Questionnaire (SDQ-20) – The SDQ-20 is a 20-item questionnaire that evaluates somatoform dissociative symptoms (Nijenhuis, 2017). Each item is answered on a Likert-type 5-point scale ranging from "1 = this applies to me NOT AT ALL" to "5 = this applies to me EXTREMELY." The score ranges from 20 to 100 and is obtained by adding the scores of the individual items. Higher scores indicate higher severity of somatoform dissociation (Nijenhuis, 2017). The internal consistency of the SDQ-20 is very good (Cronbach's alpha = .96).

2.4 Statistical analyses

Statistical analyses were carried out using the Statistical Package for the Social Sciences (SPSS), version 25.0. (IBM Corporation, Armonk, NY). The normality of data distribution was analyzed by applying the Kolmogorov–Smirnov test. For normally distributed data, statistical significance was assessed using Student’s t-test, Pearson’s correlation index, and multiple regression analysis. For non-normally distributed data, Mann–Whitney and Kruskal–Wallis tests, as well as Spearman's correlation index, were used. Statistical significance was considered for p-values \leq 0.05 (two-tailed).

3. Results

Table 1 shows the descriptive statistics relating to the scores of the questionnaires in the two groups.

Table 1. Comparison of ED and HC groups in terms of the scores of the questionnaires.

	ED (n = 45)	HC (n = 45)	p-value
TAS-20 Alexithymia	60.61±13.05	40.29±11.21	<0,001*
TAS-20 F1	24.27±7.08	13.73±5.69	<0,001*
TAS-20 F2	17.81±4.49	11.60±5.18	<0,001*
TAS-20 F3	18.53±4.83	14.96±4.66	<0,001*
BIS-11 Attention	11.67±2.89	9.24±2.24	<0,001*
BIS-11 Motor	14.93±4.14	12.27±3.15	0.003*
BIS-11 Self-Control	14.01±3.73	12.66±2.51	0.058
BIS-11 Cognitive Complexity	13.40±2.75	12.32±2.06	0.062
BIS-11 Perseverance	7.20±1.98	6.44±2.43	0.013*
BIS-11 Cognitive Instability	7.39±1.84	5.51±1.66	<0,001*
BIS-11 Attentional Impulsiveness	19.05±4.08	14.76±3.32	<0,001*
BIS-11 Motor Impulsiveness	22.13±4.86	18.45±3.72	<0,001*
BIS-11 Non-planning Impulsiveness	27.41±5.47	24.95±3.94	0.020*
BIS-11 Total Score	68.59±11.58	58.16±8.79	<0,001*
MSBS - Disengagement	50.00±13.10	31.57±14.40	<0,001*
MSBS - High Arousal	24.29±7.03	15.98±7.83	<0,001*
MSBS - Low Arousal	24.80±7.76	12.29±7.32	<0,001*
MSBS - Inattention	20.15±6.27	13.16±6.48	<0,001*
MSBS - Time Perception	23.21±9.75	11.91±6.73	<0,001*
MSBS – Total Score	142.45±37.79	84.91±37.14	<0,001*
DTQ - Verbal Perseveration	13.64±4.64	10.10±3.54	<0,001*
DTQ - Imaginal Prefiguration	14.56±3.98	11.62±3.11	<0,001*
DTQ – Total Score	28.20±7.88	21.72±5.80	<0,001*
BUT-GSI - Global Score Index	3.08±0.96	0.89±0.76	<0,001*
BUT-PST Positive Symptom Total	6.76±1.70	3.51±2.68	<0,001*
BUT-A - Weight Phobia	3.65±0.84	1.46±1.15	<0,001*
BUT-A - Body Image Concerns	3.28±1.18	1.08±1.04	<0,001*
BUT-A - Avoidance	2.65±1.18	0.32±0.49	<0,001*
BUT-A - Compulsive Self-Monitoring	2.61±1.07	0.85±0.78	<0,001*
BUTA - Depersonalization	2.83±1.33	0.44±0.53	<0,001*
SDQ - Total Score	29.29±10.52	22.98±3.91	0.001*

Data are described as mean \pm standard deviation, p = statistical difference, * = Statistical significance

Abbreviations: ED, Eating Disorders; HC, Healthy Control; TAS-20, Toronto Alexithymia Scale-20; BIS-11, Barratt Impulsiveness Scale-11; MSBS, Multidimensional State Boredom Scale; DTQ, Desire Thinking Questionnaire; BUT, Body Uneasiness Test; SDQ, Somatoform Dissociation Questionnaire.

The scores in the ED group appear significantly higher compared to the HC group. Therefore, the subjects with ED present with moderate to severe symptoms in relation to the variables considered in our study. More specifically, subjects with ED fall within the borderline range of the TAS-20 scores (60.61 ± 13.05) with higher scores especially in the factor F1 relating to the difficulty in identifying feelings (24.27 ± 7.08). Regarding the BIS-11 scores, the ED group presented with an impulsiveness score significantly higher than the control group (68.59 ± 11.58 vs 58.16 ± 8.79 , $p < 0,001$). The same trend is also observed for boredom (142.45 ± 37.79 vs 84.91 ± 37.14) and desire thinking (28.20 ± 7.88 vs 21.72 ± 5.80) scores, with statistically significant differences in the ED group compared to the controls ($p < 0,001$). Finally, about the body image disorders, ED subjects showed a relevant disorder both in relation to psychological and behavioral subscales (BUT-GSI= 3.08 ± 0.96 , average scores of the normal population: 0.45–0.75) and to the level of dissatisfaction with specific parts of their bodies (BUT-PST= 6.76 ± 1.70). Furthermore, there was a significant presence of somatoform dissociative symptoms in the ED group (29.29 ± 10.52), with an average score higher than the cut off established by Nijenhuis (2017) for eating disorders (27.7 ± 8.8).

We have investigated the correlations between the investigated variables by performing Pearson's and Spearman's correlations (Table 2).

Table 2. Correlations between TAS-20, BIS-11, MSBS, DTQ, and SDQ in ED and HC groups.

Correlation index with	ED group					HC group				
	TAS-20	BIS-11	MSBS	DTQ	SDQ	TAS-20	BIS-11	MSBS	DTQ	SDQ
TAS-20	-	$r=0.54$ $p < 0.0001$	$r=0.66$ $p < 0.0001$	$r=0.42$ $p=0.004$	$r=0.40$ $p=0.006$	-	$r=0.49$ $p=0.001$	$r=0.58$ $p < 0.0001$	$r=0.35$ $p=0.016$	$r=0.37$ $p=0.011$
BIS-11	$r=0.54$ $p < 0.0001$	-	$r=0.37$ $p < 0.0001$	$r=0.33$ $p=0.025$	$r=0.19$ $p=0.20$	$r=0.49$ $p=0.001$	-	$r=0.64$ $p < 0.0001$	$r=0.35$ $p=0.017$	$r=0.27$ $p=0.070$
MSBS	$r=0.66$ $p < 0.0001$	$r=0.37$ $p < 0.0001$	-	$r=0.43$ $p=0.003$	$r=0.38$ $p=0.01$	$r=0.58$ $p < 0.0001$	$r=0.64$ $p < 0.0001$	-	$r=0.42$ $p=0.004$	$r=0.42$ $p=0.004$
DTQ	$r=0.42$ $p=0.004$	$r=0.33$ $p=0.025$	$r=0.43$ $p=0.003$	-	$r=0.58$ $p < 0.0001$	$r=0.35$ $p=0.016$	$r=0.035$ $p=0.017$	$r=0.42$ $p=0.004$	-	$r=0.36$ $p=0.014$
SDQ	$r=0.40$ $p=0.006$	$r=0.19$ $p=0.20$	$r=0.38$ $p=0.01$	$r=0.58$ $p < 0.0001$	-	$r=0.37$ $p=0.011$	$r=0.27$ $p=0.070$	$r=0.42$ $p=0.004$	$r=0.36$ $p=0.014$	-

Abbreviations: ED, Eating Disorders; HC, Healthy Control; TAS-20, Toronto Alexithymia Scale-20; BIS-11, Barratt Impulsiveness Scale-11; MSBS, Multidimensional State Boredom Scale; DTQ, Desire Thinking Questionnaire; SDQ, Somatoform Dissociation Questionnaire.

In particular, when considering the ED group, we found that alexithymia scores correlate with impulsiveness ($r=0.54$, $p<0.0001$), boredom ($r=0.66$, $p<0.0001$), desire thinking ($r=0.42$, $p=0.004$) and somatoform dissociation scores ($r=0.40$, $p=0.006$). Furthermore, impulsiveness scores correlate with boredom ($r=0.37$, $p<0.0001$) and desire thinking scores ($r=0.33$, $p=0.025$); boredom scores also correlate with desire thinking ($r=0.43$, $p=0.003$) and somatoform dissociation ($r=0.38$, $p=0.01$) scores; somatoform dissociation and desire thinking scores are also correlated ($r=0.58$, $p<0.0001$). In the HC group, we found the stronger correlations between the following variables: alexithymia and boredom ($r=0.58$, $p<0.0001$); alexithymia and impulsiveness ($r=0.49$, $p=0.001$); impulsiveness and boredom ($r=0.64$, $p<0.0001$); boredom and desire thinking ($r=0.42$, $p=0.004$); boredom and somatoform dissociation ($r=0.42$, $p=0.004$). We also found that the first factor of the TAS-20 (difficulty in identifying feelings) strongly correlates with all the subscales of the considered variables ($p<0.0001$), both in the ED and the HC group.

As a next step, we analyzed the correlations between these variables and the scores at the BUT scale (Table 3).

Table 3. Correlations between BUT-GSI and BUT-PST and the other variables in ED and HC groups.

Correlation index with	ED group		HC group	
	BUT-GSI	BUT-PST	BUT-GSI	BUT-PST
TAS-20	$r=0.37$ $p=0.011$	$r=0.32$ $p=0.028$	$r=0.39$ $p=0.007$	$r=0.31$ $p=0.037$
BIS-11	$r=0.25$ $p=0.092$	$r=0.11$ $p=0.45$	$r=0.21$ $p=0.166$	$r=0.24$ $p=0.10$
MSBS	$r=0.65$ $p<0.0001$	$r=0.41$ $p=0.005$	$r=0.51$ $p<0.0001$	$r=0.36$ $p=0.015$
DTQ	$r=0.35$ $p=0.015$	$r=0.22$ $p=0.137$	$r=0.28$ $p=0.06$	$r=0.24$ $p=0.113$
SDQ	$r=0.29$ $p=0.05$	$r=0.17$ $p=0.247$	$r=0.30$ $p=0.04$	$r=0.17$ $p=0.26$

Abbreviations: BUT-GSI, Body Uneasiness Test Global Severity Index; BUT-PST, BUT-PST, Body Uneasiness Test Positive Symptom Index; ED, Eating Disorders; HC, Healthy Control; TAS-20, Toronto Alexithymia Scale-20; BIS-11, Barratt Impulsiveness Scale-11; MSBS, Multidimensional State Boredom Scale; DTQ, Desire Thinking Questionnaire; SDQ, Somatoform Dissociation Questionnaire.

In the ED group, BUT-GSI scores correlate with TAS-20 ($r=0.37$, $p=0.011$), MSBS ($r=0.65$, $p<0.0001$), DTQ ($r=0.35$, $p=0.015$). Furthermore, BUT-GSI also correlates with the first factor of the TAS-20 ($r=0.43$, $p=0.003$).

Regarding the BUT-PST scores, we found significant correlations with TAS-20 ($r=0.32$, $p=0.028$) and MSBS ($r=0.41$, $p=0.005$).

Finally, we performed a stepwise linear regression analysis between the considered variables in the ED group (Table 4).

Table 4. Summary of the results of the stepwise linear regression analyses in the ED group.

	BUT-GSI	BUT-PST	TAS-20	MSBS	DTQ
Multiple regression	MSBS	MSBS – Low Arousal	MSBS – Low Arousal	BUT - Avoidance	SDQ
	$R^2 = 0.45$	Arousal	BIS-11 Attention	TAS-20 F1	BIS-11 Attention
	$p < 0.0001$	$R^2 = 0.45$	$R^2 = 0.56$	$R^2 = 0.67$	$R^2 = 0.48$
		$p = 0.003$	$p < 0.0001$	$p < 0.0001$	$p < 0.0001$

Abbreviations: BUT-GSI, Body Uneasiness Test Global Severity Index; BUT-PST, BUT-PST, Body Uneasiness Test Positive Symptom Index; ED, Eating Disorders; HC, Healthy Control; TAS-20, Toronto Alexithymia Scale-20; BIS-11, Barratt Impulsiveness Scale-11; MSBS, Multidimensional State Boredom Scale; DTQ, Desire Thinking Questionnaire; SDQ, Somatoform Dissociation Questionnaire.

Regarding the BUT-GSI scores, the stepwise method selected as the independent variable the feelings of boredom (MSBS), which explain 45% of the total variance in the BUT-GSI subscale ($R^2 = 0.45$, $p < 0.0001$). Furthermore, regarding the BUT-PST scores, the most predictive variable was the MSBS Low Arousal subscale, but it explains only 18% of the total variance in the BUT-PST subscale ($R^2 = 0.18$, $p = 0.003$). Interestingly, we also found other significant results. In particular, TAS-20 are strongly predicted by low arousal (MSBS) and attention (BIS-11) ($R^2 = 0.56$, $p < 0.0001$). The BUT avoidance subscale and the first factor of the TAS-20 appeared to be strongly predictive of feelings of boredom ($R^2 = 0.67$, $p < 0.0001$). Finally, the most predictive variable of the DTQ scores were the SDQ scores and the attention subscale of the BIS-11 ($R^2 = 0.48$, $p < 0.0001$).

4. Discussion and Conclusions

This study aimed to explore the relationship between alexithymia and body image disorders in a sample of subjects with EDs and HC. We also investigated the role of other psychological variables in maintaining these disorders: impulsiveness, boredom, and desire thinking.

EDs are shown to be strongly associated with body image disorders and somatoform dissociation (Artoni et al., 2020; Fatt et al., 2020; Nilsson et al., 2020). More specifically, somatoform dissociation refers to dissociative symptoms involving the physical sphere that are not attributable to organic disorders and linked to the difficulty of integrating the somatic aspects of an experience (Braden et al., 2018; Van der Hart et al., 2006). According to the literature on the topic, EDs are associated with presence and severity of dissociative symptoms (Nilsson et al., 2019). To confirm this, we found significantly high scores for body image disorders and somatoform dissociative symptoms in ED patients than HCs.

Furthermore, according to the recent literature on the topic (Corcos et al., 2000), we found significantly higher levels of alexithymia in the group of ED patients. More specifically, although the scores for both the affective and cognitive components of alexithymia are significantly higher than in the control group, affective elements of alexithymia seem to be more prevalent in ED patients than cognitive factors. Also this point is in agreement with the recent findings of other authors and confirms that ED patients have significant difficulties in identifying their feelings (Fenwick & Sullivan, 2011; Lawson et al., 2008).

Previous studies highlighted a relevant component of impulsivity in patients with ED and a significant association between impulsiveness and emotion dysregulation (Soidla & Akkermann, 2020). In this regard, we found higher levels of impulsivity in ED patients than in HC. In particular, ED patients show a significant inclination to act without thinking and a focus on the task as well as a strong orientation to the present rather than to the future. Moreover, according to our findings, alexithymia is strongly correlated with impulsivity, especially regarding the difficulty in recognizing emotions.

As for boredom, confirming the data that highlight an important role of this variable in influencing eating behavior (Braden et al., 2018; Crockett et al., 2015), our results reported significantly higher levels of boredom in ED patients compared to HCs. ED patients tend to be disengaged from their environment and inattentive, perceive time as passing slowly, and alternate moments of high and low arousal. As we had hypothesized, there is a significant relationship between boredom, alexithymia, impulsivity, and desire thinking in ED subjects. Furthermore, boredom is also significantly associated with body dissatisfaction and somatoform dissociative symptoms. Therefore, these data suggest an important role of boredom in eating disorders regarding body image perception and the regulation of emotions.

Desire thinking is another important variable to consider in ED patients. The subjects of our group report high scores both in the verbal component (Verbal Perseveration) and in the imaginative component (Imaginal Prefiguration) of desire thinking. This data is in line with the recent findings according to which desire thinking has an important role in maintaining addictive behaviors such as EDs (Caselli & Spada, 2010, 2011). We also found a significant association between alexithymia, impulsivity, and desire thinking; furthermore, desire thinking is also correlated with body image disorders and somatoform dissociative symptoms in our sample.

By multiple regression analyses, we showed that the feelings of boredom have a prevalent role in the structuring of body image disorders as they explain 45% of the variance in the BUT-GSI scores. In turn, alexithymia, and in particular its affective component, plays an important role in determining the experiences of boredom in ED subjects together with the avoidance

behaviors related to body image. Interestingly, we also found that desire thinking is predicted by somatoform dissociative symptoms and the attentional component of impulsiveness.

Therefore, our results seem to confirm that alexithymia, boredom, impulsivity, and desire thinking are strictly related in ED subjects, as reported in the recent literature about this topic (Corcos et al., 2000; Crockett et al., 2015; Soidla & Akkermann, 2020). Furthermore, the difficulty in identifying feelings has an important role in determining boredom experiences in these patients, and boredom, in turn, contributes significantly to structuring body image disorders. Finally, the presence of somatoform dissociative symptoms in ED subjects seems to be predictive of desire thinking, which is the voluntary cognitive process aimed to prefigure images, information, and memories about the positive target-related experience.

However, our study has some limitations that may have influenced the discussed results. First of all, we used self-report questionnaires with the consequent risk of patients who underreported or overreported their symptoms. Furthermore, our sample is relatively small so further studies with larger samples will be needed to confirm our results.

In conclusion, this study adds new insights into the associations between alexithymia, boredom, impulsiveness, and desire thinking in subjects with eating disorders. Future areas of investigation could better explore the role of boredom experiences in structuring body image dissatisfaction and its relationship with alexithymia. Recent advances in neuropsychology and functional neuroimaging techniques could be useful to add valuable information on the topic.

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