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**BINGE EATING DISORDER IN ADOLESCENCE: THE ROLE OF
ALEXITHYMIA AND IMPULSIVITY**

Giulia Ballarotto (a)*

*Corresponding author

(a) Department of Dynamic and Clinical Psychology, Faculty of Medicine and Psychology, Sapienza University of Rome, Via dei Marsi n. 78, 00185 Rome, Italy, giulia.ballarotto@uniroma1.it

Abstract

Binge Eating Disorder (BED) is a disorder, recently included in DSM-5, often present in adolescence. Several studies highlight that adolescents with BED had high levels of impulsivity and alexithymia. Even though studies have underlined the importance of these variables, no studies have investigated their role on adolescents' emotional-behavioral functioning. This study proposes to verify if adolescents affected by BED show higher levels of alexithymia and impulsivity than adolescents without diagnosis, and what is their role on adolescents' emotional-behavioral functioning. Thanks to the collaboration with clinical centers for eating disorders, a group composed by 60 adolescents diagnosed with BED was paired to a 60 healthy controls. Participants completed validated self-report questionnaires investigating levels of alexithymia, impulsivity and emotional-behavioral functioning. Adolescents diagnosed with BED showed higher scores on alexithymia, impulsivity and maladaptive emotional-behavioral functioning than healthy controls. Moreover, alexithymia had a mediating effect on the relationship between impulsivity and emotional-behavioral functioning. These results show that alexithymia is a key variable influencing the emotional-behavioral functioning of adolescents affected by BED. Further studies are needed to also check other variables that might lead to the onset of BED. On the other hand, our findings can help clinicians suggesting the importance of promoting prevention and treatment polices focused on alexithymia.

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Keywords: Binge Eating Disorder, adolescents, impulsivity, alexithymia.



1. Introduction

Binge Eating Disorder (BED) is a diagnosis that it has been recently included in DSM-5 (American Psychiatric Association, 2013). On the base of DSM-5 diagnostic criteria, people, during binge eating episode, consumption a great deal of food, in a discrete period of time. Furthermore they experimented a sense of lack of control over eating, and they are in distress about binge eating (American Psychiatric Association, 2013). Several studies underlined that severe proportions among adolescents reported unhealthy eating behaviors, such as BED (Smink, van Hoeken, Oldehinkel, & Hoek, 2014). This data was followed by a growing scientific interest in BED, but few studies have investigated the role of the variables involved in the diagnosis of the disorder in adolescent populations.

2. Problem Statement

Puberty was defined as an important time for the start of binge eating behaviors (Cerniglia, Cimino, Ballarotto, & Monniello, 2014; Pearson, Zapolski, & Smith, 2015) and during adolescence many changes occur (biological, psychological and social changes). Allen and colleagues (2013) has conducted a longitudinal study to highlighted the prevalence of BED during adolescents. Authors found that BED was present in 0% of males and 1,8% of females aging 14; when the same adolescents aged 17 years, BED was present in 1,2% of males and 1,4% of females. It was found differences between males and females adolescents diagnosed with BED: females showed internalizing symptoms, such as withdrawal and depression, whereas males showed externalizing symptoms, such as aggressive and delinquent behaviors (Zaider, Johnson, & Cockell, 2002). Furthermore, Tafà and coll. (2016) found an association between female adolescents with BED and symptoms of interpersonal sensitivity and psychoticism.

3. Research Questions

It was found that an important individual characteristic contributing to the onset and maintenance of BED is impulsivity (Schag et al., 2013; Manasse et al., 2016). Impulsivity can be defined as a predisposition to respond to external stimuli internally with unplanned reactions; the impulsive reaction occurs without taking into account the possible negative consequences for the impulsive individual or for others (Gullo, Loxton, & Dawe, 2014). The authors that have investigated impulsivity in eating disorder have found conflicting results. Although there are evidences that patients with binge eating behaviors had higher scores on impulsivity (Boone, Claes, & Luyten, 2014), these studies did not take into account patients diagnosed for BED, but subjects with binge eating behaviors. Furthermore, these studies did not clarify what role is played by impulsivity in the onset of binge eating behaviors.

Teten and colleagues (2008) found that a factor that is involved on the impulsive behaviors is alexithymia, construct that describe an inability to identify and describe own emotions, despite an adequate emotional vocabulary (Sifneos, 1973). Recent studies (Karukivi, Polonen, Vahlberg, Saikkonen, & Saarijarvi, 2014) underlined that adolescents who showed binge eating behaviors had more severe levels of alexithymia than adolescents from general population. Nock and Prinstein (2004) have hypothesized that difficulty in modulating negative emotions mediates the relationship between binge eating behaviour and alexithymia. Extensive literature review (e.g. Serafini et al., 2017) shows that

alexithymia and impulsivity are considered as two separated constructs each other. Loftis (2012) has studied the role of alexithymia and impulsivity in the suicidal behavior on young adults. The author found that when variables were included together in a regression model, only alexithymia remained statistically significant, suggesting that the presence of alexithymia was the stronger predictor of suicidal behaviors, connected to internalizing and externalizing problems (Szanto et al., 2012).

4. Purpose of the Study

Previous literature has posited that alexithymia may have a mediating role between impulsivity and emotional-behavioral functioning (Szanto et al., 2012). However, no other studies to my best knowledge have specifically investigated the relationship between impulsivity and alexithymia in adolescents with BED and their influence on adolescents' emotional-behavioral functioning. Therefore, the present study aimed to verify whether:

- adolescents diagnosed with BED show higher impulsivity, alexithymia and a more maladaptive emotional-behavioral functioning than adolescents from general population;
- alexithymia has a mediating effect between adolescents' impulsivity and their emotional-behavioral profiles.

5. Research Methods

5.1. Procedure and participants.

Thanks to collaboration with Italian public and private centers for eating disorders, I recruited N=60 adolescents who requested a clinical support for disordered eating and that were diagnosed for Binge Eating Disorder (BED), on the base of DSM-5 criteria (American Psychiatric Association, 2013). Furthermore, it has been recruited a group of adolescents from general population. This group was paired with the clinical one, on the basis of socio-demographic characteristics. Thus, research groups are as follows: Group Cl: adolescents diagnosed with Binge Eating Disorder (N=60; 32 boys and 28 girls); Group Con: adolescents from general population (N=60; 30 boys and 30 girls). Average age of the adolescents was 15.6 (s.d = 0.68).

Ethical Committee of the Psychology Faculty at University of Rome, Sapienza, approved this study before its start, in accordance with the Declaration Helsinki and all adolescents' parents signed an informant consent. Research group prepared an anamnestic questionnaire appositely for this study, that was filled out by the adolescents before the treatment. Also, it was been administered the following self-reporting instruments.

5.2. Measures

The *Barratt Impulsiveness Scale* (BIS-11; Patton & Stanford, 1995) is a 30 items self-report scale constructed to investigate and to evaluate the construct of impulsivity. The BIS-11 provides a total score, which can be subdivided into three main subscales: attentional impulsivity (a scale that assess difficulties to concentrate or maintain attention), motor impulsivity (a scale that evaluates impulsivity in situations where subjects act without thinking) and non-planning impulsivity (lack of future orientation or

forethought). Fossati and coll. (2001) have taken care of Italian validation, which shows good psychometric qualities (test-retest reliability $r = .889$ and Cronbach's alpha = $.79$).

The *Youth self-report/11-18* (YSR/11-18) (Achenbach, 1991; Italian version – Frigerio et al., 2001). This tool is a 112 items self-report scale, constructed to investigate emotional and behavioral difficulties, which adolescents may have found in the past 6 months. The YSR/11-18 provides a Total Problem Scale, which can be subdivided into two scales: Internalizing problems and Externalizing problems. Achenbach and Rescorla (2001) found good psychometric proprieties: Cronbach's alphas ranged from $.71$ to $.95$.

The *Toronto Alexithymia Scale* (TAS-20) is a 20 items self-report scale (Bagby, Parker, & Taylor, 1994; Italian version – La Ferlita, Bonadies, Solano, De Gennaro, & Gonini, 2007), assessing construct of alexithymia. In fact, the scale is composed by three factors, that that reflect the main components of the construct. The first factor (F1) assess the ability to identify feelings and to differentiate them from phisical sensations. Factor 2 (F2) evaluates the ability to describe verbally own emotions. Factor 3 (F3) assess externally oriented thinking. The questionnaire shows good psychometric proprieties. In fact, the coefficient of internal reliability is $.86$).

5.3. Statistical analyses

To examine the adolescents' personality/behavioral construct of impulsivity and the emotional and behavioral profiles in both groups, it has been conducted a multivariate analyses of variances (MANOVA). Dependent variables were YSR/11-18, BIS-11 and TAS-20 scores, considering the effects of group, age and gender. It have been carried out univariate analysis, on significant effects. Adolescents' age and sex did not show significant effects.

Furthermore, it have been carried out hierarchical regressions to verify the possible contribution and the possible mediating effect (see also Preacher & Hayes, 2004) of impulsivity and difficulties to describe and identify feelings in a group of adolescents with diagnosis of BED and in a control group on all subscales of YSR/11-18. In order to conduct analysis, it has been used the Statistical Package for the Social Sciences 23.0.

6. Findings

6.1. Adolescents' personality/behavioral construct of impulsiveness, emotional-behavioral profiles and ability to describe and identify feelings

In order to verify whether adolescents who diagnosed with BED showed impulsivity high scores, a maladaptive emotional-behavioral functioning and higher levels of alexithymia, than adolescents from general population, a Multivariate analysis of variance was conducted on BIS-11, YSR/11-18 and TAS-20 scores. Analysis showed an effect of the variable "group" ($\lambda = 0.059$; $F = 107.286$; $p < 0.001$). In Table 1 are shown average scores, standard deviations, F and p values.

Table 01. Average scores, standard deviations, F and p values of YSR/11-18, BIS-11, TAS-20 of both Groups

Tools	Scales	Group Cl	Group Con	F	p values
YSR/11-18	Internalizing problems	25.4 (10.22)	7.25 (1.73)	189.18	<0.001
	Externalizing problems	27.54 (9.31)	7.25 (1.73)	256.56	<0.001
	Total problems	55.22 (28.75)	7.29 (1.87)	158.82	<0.001
BIS-11	Total Score	89.67 (11.35)	37.42 (3.15)	988.94	<0.001
TAS-20	F1	22.22 (6.21)	7.13 (1.99)	303.54	<0.001
	F2	9.79 (3)	7.45 (1.31)	21.75	<0.001
	F3	23.47 (7.57)	6.54 (2)	271.39	<0.001

Adolescents' scores on all BIS-11 subscales were significantly higher in Group Cl, than in Group Con (Bonferroni post-hoc test; $p < 0.001$); $N=46$ adolescents of Group Cl and none of Group Con exceeded of 2-3 standard deviations mean score of BIS Total Score for the Italian populations (Fossati et al., 2001). Adolescents' scores on all YSR/11-18 scales were significantly higher in Group Cl, compared to Group Con. $N=38$ adolescents of Group Cl and none of Group Con exceeded the YSR/11-18 clinical cut-off. Furthermore, adolescents' scores on all factors of TAS-20 were significantly higher in Group Cl, than in Group Con (Bonferroni post hoc test; $p < 0.001$). $N=30$ adolescents in Group Cl and none in Group Con exceeded TAS-20 clinical cut-off (La Ferlita et al., 2007).

6.2. Contribution of impulsivity and difficulties to describe and identify feelings on adolescents' emotional-behavioral functioning on Group Con

To verify whether a high impulsivity and difficulties to describe and identify feelings predicted more difficulties in adolescents' emotional and behavioural functioning and in order to investigate whether there was a mediating effect between these variables, two hierarchical regressions were conducted. BIS-11 and TAS-20 subscales were used as predictors, in two different hierarchical orders, whereas YSR/11-18 scores were used as regressors. Table 2 and Table 3 show R^2 , β , t and p values for YSR/11-18 in hierarchical regressions.

Table 02. Hierarchical regression model: adolescents' impulsivity and alexithymia features on their emotional-behavioral functioning, in Group Con

		Internalizing Dimension				Externalizing Dimension				YSR/11-18 Total Score			
		β_1	β_2	β_3	R2	β_1	β_2	β_3	R2	β_1	β_2	β_3	R2
1	Sex	Ns	Ns	Ns	.01	Ns	Ns	Ns	.003	Ns	Ns	Ns	.018
	Age	Ns	Ns	Ns		Ns	Ns	Ns		Ns	Ns	Ns	
2	Att.		Ns	Ns	.03		Ns	Ns	.03		Ns	Ns	.03
	Mot.		Ns	Ns			Ns	Ns			Ns	Ns	
	Non Pl.		Ns	Ns			Ns	Ns			Ns	Ns	
3	F1			Ns	.09			Ns	.06			Ns	.08
	F2			.26*				Ns				.25*	
	F3			Ns							Ns		

Note. β_1 =beta at step 1; β_2 =beta at step 2; β_3 =beta at step 3; R^2 =R Square; *significant at $p < .05$; Ns=not significant;

Att.= attentional impulsivity; Mot.= motor impulsivity; Non Pl.= non planning impulsivity

Table 03. Hierarchical regression model: adolescents' alexithymia and impulsivity features on their emotional-behavioral functioning, in Group Con

		Internalizing Dimension				Externalizing Dimension				YSR/11-18 Total Score			
		β1	β2	β3	R2	β1	β2	β3	R2	β1	β2	β3	R2
1	Sex	Ns	Ns	Ns	.013	Ns	Ns	Ns	.003	Ns	Ns	Ns	.018
	Age	Ns	Ns	Ns		Ns	Ns	Ns		Ns	Ns	Ns	
2	F1		Ns	Ns	.088		Ns	Ns	.037		Ns	Ns	.067
	F2		.27*	.26*			Ns	Ns			.23*	.25*	
	F3		Ns	Ns			Ns	Ns			Ns	Ns	
3	Att.			Ns	.094			Ns	.06			Ns	.081
	Mot.			Ns				Ns				Ns	
	Non Pl.			Ns								Ns	

Note. β1=beta at step 1; β2=beta at step 2; β3=beta at step 3; R²=R Square

*significant at p<.05; Ns=not significant.

Att.= attentional impulsivity; Mot.= motor impulsivity; Non Pl.= non planning impulsivity

The analyses showed that Factor 2 of TAS-20 contributed significantly to explain higher scores for adolescents in the internalizing dimension scale and in YRS/11-18 total score. In particular, F2 influenced significantly Internalizing dimension scores (β= .26; t= 2.13; p< .05) and the YSR/11-18 Total score (β= .25; t= 2.03; p< .05) even when was present impulsivity variables.

6.3 Contribution of impulsivity and difficulties to describe and identifying feelings on adolescents' emotional-behavioral functioning on Group Cl.

To verify whether a high impulsivity and difficulties to describe and identifying feelings predicted more difficulties in adolescents' emotional and behavioural functioning and in order to investigate whether there was a mediating effect between these variables, two hierarchical regressions were conducted. BIS-11 and TAS-20 subscales were used as predictors, in two different hierarchical orders, whereas YSR/11-18 scores were used as regressors.

Table 4 and 5 show R², β and p values for YSR/11-18 in hierarchical regression.

Table 04. Hierarchical regression model: adolescents' impulsivity and alexithymia features on their emotional-behavioral functioning, in Group Cl

		Internalizing Dimension				Externalizing Dimension				YSR/11-18 Total Score			
		β1	β2	β3	R2	β1	β2	β3	R2	β1	β2	β3	R2
1	Sex	Ns	Ns	Ns	.008	Ns	.2*	Ns	.062	Ns	Ns	Ns	.037
	Age	Ns	Ns	Ns		Ns	Ns	Ns		Ns	Ns	Ns	
2	Att.		.38**	Ns	.562		.28*	Ns	.461		.42***	Ns	.707
	Mot.		.27*	Ns			Ns	Ns			.22*	Ns	
	Non Pl.		Ns	Ns			.27*	Ns			.33***	.26***	
3	F1			Ns	.647			.23*	.643			.23*	.834
	F2			Ns				Ns				Ns	
	F3			.39***				.43***				.33***	

Note. β1=beta at step 1; β2=beta at step 2; β3=beta at step 3; R2=R Square

***significant at p<.001; **significant at p<.01; *significant at p<.05; Ns=not significant.

Att.= attentional impulsivity; Mot.= motor impulsivity; Non Pl.= non planning impulsivity

Table 05. Hierarchical regression model: adolescents’ alexithymia and impulsivity features on their emotional-behavioral functioning, in Group C1

		Internalizing Dimension				Externalizing Dimension				YSR/11-18 Total Score			
		β1	β2	β3	R2	β1	β2	β3	R2	β1	β2	β3	R2
1	Sex	Ns	Ns	Ns	.008	Ns	Ns	Ns	.062	Ns	Ns	Ns	.037
	Age	Ns	Ns	Ns		Ns	Ns	Ns		Ns	Ns	Ns	
2	F1		.34**	Ns	.597		.31**	.23**	.618		.43***	.23**	.731
	F2		Ns	Ns			Ns	Ns			Ns	Ns	
	F3		.5***	.39***			.47**	.43***			.47***	.33***	
3	Att.			Ns	.647			Ns	.643			Ns	.834
	Mot.			Ns				Ns				Ns	
	Non Pl.			Ns				Ns				.26***	

Note. β1=beta at step 1; β2=beta at step 2; β3=beta at step 3; R2=R Square

***significant at p<.001; **significant at p<.01; *significant at p<.05; Ns=not significant.

Att.= attentional impulsivity; Mot.= motor impulsivity; Non Pl.= non planning impulsivity

The analyses show that Attentional impulsivity influenced significantly Internalizing dimension scores ($\beta = .38$; $t = 3.34$; $p < .001$), Externalizing dimension scores ($\beta = .28$; $t = 2.26$; $p < .05$) and YSR/11-18 Total Score ($\beta = .42$; $t = 4.61$; $p < .001$), but only when it was not present alexithymia variables. Motor Impulsivity influenced significantly Internalizing dimension scores ($\beta = .27$; $t = 2.35$; $p < .05$), and YSR/11-18 Total Score ($\beta = .22$; $t = 2.49$; $p < .05$), only when it was not present alexithymia variables. Moreover, Non Planning Impulsivity influenced significantly YSR/11-18 Total Score both when it was no present alexithymia variables ($\beta = .33$; $t = 3.71$; $p < .001$), both when it was present ($\beta = .26$; $t = 3.74$; $p < .001$).

As regard alexithymia variables, F1 influenced significantly Internalizing dimension scores ($\beta = .34$; $t = 3.32$; $p < .01$), only when it was no present impulsivity variables and influenced Externalizing dimension scores ($\beta = .31$; $t = 3.06$; $p < .01$) and YSR/11-18 Total Score ($\beta = .43$; $t = 5.21$; $p < .001$), even when impulsivity variables were present. F3 influenced significantly Internalizing dimension scores ($\beta = .5$; $t = 4.93$; $p < .001$), Externalizing dimension scores ($\beta = .47$; $t = 4.72$; $p < .01$) and YSR/11-18 Total Score ($\beta = .47$; $t = 5.79$; $p < .01$), even when impulsivity variables were present.

7. Conclusion

The present paper aimed to assess the emotional and behavioral profiles in adolescents diagnosed with BED. More specifically, this study intended to assess the influence of impulsivity and alexithymia on adolescents’ emotional-behavioral functioning.

Our results pointed out that adolescents diagnosed with BED showed more impulsivity than adolescents from general population. Lee-Winn and colleagues (2016) found positive correlations between neuroticism and impulsivity and prevalence of binge eating during adolescents. In line with previous research studies (Pasold, McCracken, & Ward-Begnoche, 2014), analyses showed that adolescents with BED showed more maladaptive emotional-behavioral functioning. Furthermore, in our sample, adolescents with BED showed higher levels of alexithymia, as supported by other studies that

underlined that adolescents and adults with eating disorders show more difficulties to identify and communicate their emotions (Brewer, Cook, Cardi, Treasure, & Bird, 2015). Zeeck and colleagues (2011) highlighted that adults with diagnosis of BED showed more difficulties in identifying and expressing feelings and hypothesized an interaction between psychological diseases and emotion regulation problems. So, I aimed to found how alexithymia and impulsivity variables influenced the emotional and behavioural functioning in early onset of BED in adolescence.

Analyses on the control group showed that the ability to describe feelings to other influenced adolescents' problems on the internalizing dimension and on YSR/11-18 total score. An interesting finding is that the influence of this variable is not affected by impulsivity. It therefore appears that in healthy adolescents, high alexithymia scores involve more emotional and behavioral problems. In line with these results, Di Trani and colleagues (2013) found that difficulties identifying feelings factor predicted significantly internalizing and externalizing problems in healthy adolescents (see also Cerniglia et al., 2015). On the other hand, analyses on adolescents with BED showed different results. In fact, I found that inability to focus attention and acting without thinking influenced adolescents' emotional-behavioral functioning only when in hierarchical regressions alexithymia was not present. These data indicate that the influence between attentional impulsivity and motor impulsivity, and emotional behavioral functioning, was mediated by the alexithymia. Moreover, the lack of future orientation seemed influence emotional-behavioral functioning, independently by the presence of alexithymia in the hierarchical regressions. These data are in line with Zhou and colleagues' (2014) who found that not planning facets of impulsivity were associated with self-reported anxiety and depression. With regard to alexithymia variables, the ability to identify feelings significantly influenced internalizing dimension scores only when impulsivity variables were not present in hierarchical regressions, but influenced externalizing dimension scores even when impulsivity variables were present. Moreover, externally oriented thinking influenced adolescents' emotional-behavioral functioning, independently by the presence of impulsivity variables in hierarchical regressions. These data indicate that alexithymia variables seem to influence adolescents' emotional-behavioral functioning and that these variables are mediators to the relationship between impulsivity and emotional-behavioral problems, except for non-planning impulsivity. These results allow us to hypothesize that alexithymia is the major variable that influence the emotional and behavioral problems of adolescents affected by BED.

This study has several limits. First, it has been not consider adolescents' weight. Research sustained that depression-related symptoms are important risk factors for eating disorders among overweight teenager (Goldschmidt, Wall, Loth, & Neumark-Sztainer, 2015; Tambelli et al., 2017). Allen and colleagues (2014) underlined that the perception of its own weight in young people is not an important risk factor, but rather it is the parent's perception of the weight of the son. This connect with the second limitation of the study. I did not evaluate parents' possible psychopathological risk and family functioning. In fact, it has been demonstrated that it could have a weight on the severity of children symptoms (Tambelli, Cimino, Cerniglia, & Ballarotto, 2015; Tambelli, Cerniglia, Cimino, & Ballarotto, 2015). Despite this, in this study I was primary interested to assess the individual psychological characteristics of adolescents and the influence of alexithymia and impulsivity on the onset of binge eating behaviors. Notwithstanding these limitations, this study adds to previous literature, suggesting that

the alexithymia has a mediating effect between impulsivity and emotional and behavioural problems, both in healthy adolescents, both in adolescents affected by BED. This results can suggest the development of treatment and prevention polices specific on the alexithymia features.

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