

## Exploring mentalizing in adolescents with anorexia nervosa and borderline personality disorder: A comparative study of psychiatric inpatients and healthy controls

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### Abstract

**Background:** Impaired mentalizing, i.e., difficulties in understanding oneself and others in terms of mental states, has been associated with the development of Anorexia Nervosa (AN), mainly among adults. However, few studies have addressed this question in clinical samples of adolescents with AN. Moreover, no study has explored mentalizing abilities among inpatient adolescents presenting with AN and Borderline Personality Disorder (BPD), despite their high comorbidity in a highly relevant age group.

**Objective:** This study attempted, for the first time, to further examine differences in mentalizing abilities and to identify specific mentalizing impairments in different psychiatric inpatient groups and healthy adolescents.

**Methods:** Using samples of female adolescents aged 12–17, comparison analyses were performed between psychiatric inpatient adolescents with AN ( $n = 44$ ), BPD ( $n = 101$ ), AN+BPD ( $n = 48$ ), other psychopathology ( $n = 163$ ) and healthy adolescents ( $n = 129$ ). Structured and semi-structured clinical interviews, and two experimental tasks were administered to assess AN, BPD and mentalizing, respectively.

**Results:** Comparison analyses showed that patients with BPD and other psychiatric disorders evidenced higher levels of hypermentalizing compared to healthy adolescents. Hypermentalizing was also reported among inpatients with AN+BPD, although to a lesser extent. BPD and AN scores were positively correlated with hypermentalizing responses.

**Conclusions:** Our results suggest that hypermentalizing is a specific mentalization impairment in inpatient adolescents, particularly with BPD and both AN+BPD. Further investigation into the efficacy of mentalization based treatments for adolescents with BPD and AN+BPD is recommended. Prospective studies are needed to assess mentalizing using experimental tasks among adolescents with AN, taking into account the potential influence of temporality and severity of the disorders' symptoms.

**Keywords:** Anorexia Nervosa; Borderline Personality Disorder; mentalizing; theory of mind; adolescents; inpatient

### Introduction

Adolescence is a developmental period characterized by significant biological, psychological and social changes; therefore, it is a vulnerable period for the development of various psychological disorders (1), including Anorexia Nervosa (AN) (2) and Borderline Personality Disorder (BPD) (3, 4). AN is among the most difficult mental disorders to treat, is associated with severe health complications, and has a high risk of chronicity and mortality (5, 6). Likewise, BPD is a complex psychiatric disorder, which often results in severe functional impairment and is associated with

a high risk of suicide and extensive use of treatment (7). Importantly, AN, specifically purging and binge-purging subtype, and BPD are highly comorbid (8–10), and present various therapeutic challenges (11). In particular, the presence of comorbid AN+BPD has been associated with a complicated prognosis, characterized by stable remissions but frequent migrations to other Eating Disorders (ED), and with poor treatment response (12). Due to increased high risk associated with this comorbidity, especially during adolescence, it is crucial to identify and understand factors that might

be underlying both disorders in order to inform assessment and treatment efforts.

In this regard, it has been suggested that impaired mentalizing may be an important mechanism underlying both disorders (11, 13). Mentalization refers to the capacity to understand oneself and others in terms of intentional internal mental states such as thoughts, feelings, intentions, and desires (14). This capacity develops in the context of early attachment relationships, and subsequently, any disruption of early attachment experiences can lead to altered development of mentalizing capacities (15, 16). Several studies have reported mentalizing difficulties among adults with AN (17–19). According to Skårderud & Fonagy (11), impaired mentalizing could explain some AN symptoms such as restricted eating or purging as a way to reduce anguished feelings and gain control. Difficulty detecting stimuli within their bodies has been chronicled as low *embodied mentalizing* which might explain how patients with AN seem unaware of fatigue or hunger. Moreover, a lack of understanding of or concern for other's point of view among patients with EDs is common. Hence, evidence suggests that patients with AN might present with *hypomentalizing* or an inability to consider the inner mental states and emotions underlying the actions of themselves and others (11).

Similarly, impaired mentalizing also represents a central feature of BPD among adults (13, 15). Specifically, BPD symptoms of affect dysregulation, impulsivity and disturbed interpersonal relationships might be the result of an erroneous attribution of emotions, thoughts and intentions to others, along with reduced emotional empathy and anomalous emission of social signals (20, 21). Therefore, BPD patients present with impaired mentalizing in terms of *hypermentalizing* (16, 22), which is the use of excessive thoughts and reflections about the mental states of others, that may lead to inaccurate assumptions of others' intentions and excessive inference (13).

To date, there has been little research exploring mentalizing among adolescents despite the fact that adolescence appears to be a vulnerable stage for the development of both AN and BPD. The few studies that have investigated mentalizing abilities in AN adolescent samples have yielded mixed results (23). For instance, when comparing samples of adolescents with AN to healthy adolescents (HC), it was found that the AN sample performed significantly worse than HC's in emotion recognition tasks (24, 25). Further, Rothschild-Yakar et al. (26) observed that adolescents with EDs reported significantly lower levels of symbolic self-representation and more negative representations of their parents in comparison to HC's. Recently, it was

found that adolescents with AN displayed important deficits in theory of mind compared to HC's (27). In contrast, Schulte-Rüther et al. (28) did not find any differences in theory-of-mind between an AN group and HC adolescents based on behavioral experiments.

Research has supported a link between mentalizing impairment and BPD in adolescents. Sharp et al. (29) provided robust evidence of compromised mentalizing in adolescent inpatients with borderline traits. Further studies, using the Movie Assessment of Social Cognition (MASC; 30), have determined that these difficulties might be reflected in terms of hypermentalizing (16, 22). Recently, other studies have supported these findings suggesting that hypermentalizing may be an important treatment target, influencing symptoms and interpersonal functioning in adolescents with BPD (31–33).

While there is some evidence that impaired mentalizing may contribute to the development of both AN and BPD, few studies have explored this among adolescents, and in the context of typical adolescent development. Moreover, to our knowledge, no study has explored mentalizing among adolescents presenting with the co-occurrence of both disorders. To address these gaps in the literature, the present study aimed to 1) examine differences in terms of mentalizing abilities between adolescent inpatients (with AN, BPD, AN+BPD, and those with neither disorder deemed psychiatric controls (PCs)) and healthy adolescents (HC) and 2) identify specific forms of mentalizing impairments (i.e., hypermentalizing and hypomentalizing) that may be experienced by the full sample of inpatient adolescents, using group comparison and correlational analyses. Specifically, we will first perform group comparisons analyses driven by a categorical approach towards diagnosing mental disorders, often used by clinicians as it facilitates communication among them. However, given that psychopathology likely exists on a continuous spectrum of severity, rather than by the presence or absence of a specific type of disorder, correlational analyses will also be conducted to benefit from a dimensional approach where BPD and AN symptoms are continuously scored. This type of dimensional approach allows clinicians more latitude to assess the severity of a condition (34) which is particularly relevant during adolescence when symptom presentation may still be in the subclinical range, yet resulting psychosocial impairment still resembles full-threshold presentations (35, 36). By taking this integrated approach (both categorical and dimensional perspective), we will provide better guidance to clinicians and inform prevention and intervention efforts.

In the present study, we will use two tasks of mentalizing: the Child Eyes Test (CET; 37) which is an experimental task that measures children and adolescent's capacity for explicit mentalizing, and the Movie for the Assessment of Social Cognition (MASC; 30), an ecologically well-validated measure of implicit mentalization among children and adolescents (4). Using two assessments of mentalizing acknowledges the fact that mentalizing is a complex, multidimensional construct which may be differentially associated with outcomes depending on the type of mentalizing assessed (4). Each measure taps into different dimensions that characterize mentalizing. For instance, the CET taps into explicit-controlled mentalizing. Explicit-controlled mentalizing involves a deliberate and conscious attempt to imagine the mental states of others, typically using external features of the other. Thus, the task draws on an individual's capacity to read the mental state of others from external cues (i.e., a pair of eyes), which requires a level of intention, awareness, and consciousness that is not automatic but reflects a form of explicit, conscious mentalizing (22). On the other hand, the MASC also asks for reflection but is heavily dependent on contextual cues, and involves a more unconscious and implicit processing of social information from indicators that are not physically apparent (38). As such, this measure requires the participant to infer the mental states of others through more unconscious, automatic, or procedural operations (implicit mentalizing) which are based on their own thoughts, feelings, and internal experiences (15, 22, 39).

In line with theory and previous findings, we expected to find less accurate explicit and implicit mentalizing among the clinical sample (adolescents with AN, BPD, with both disorders and PC) relative to HC's. Because of limited evidence comparing mentalizing between inpatient adolescents with BPD and AN compared to PCs, these analyses were exploratory. Regarding the group of inpatient adolescents with AN+BPD, we considered the possibility that these individuals may experience a synergistic effect of the disorders, where both diagnoses increase mentalizing difficulties more so than either disorder alone. As this is a novel understudied question, we did not make specific hypotheses regarding this group. Finally, we also predicted that adolescents with more BPD symptoms would experience higher levels of hypermentalizing and adolescents with more AN symptoms would report higher levels of hypomentalizing than healthy adolescents.

## Methods

### *Participants*

The current study utilized two adolescent samples. The first sample consisted of adolescent inpatients recruited as part of a larger study between October of 2008 and June of 2016 from a private psychiatric hospital. Adolescents who complete inpatient treatment at this facility experience a wide range of behavioral and emotional disorders, which have not yet responded to intervention. Upon an adolescent's admission to the hospital, parents were approached and invited to participate in the study and were asked to provide informed consent for their child to participate. If parents consented, adolescents were then approached to provide informed assent to participate. To be included in the current study, adolescents had to be female, demonstrate proficiency in English, be between the ages of 12 and 17 and must have completed both the computerized Diagnostic Interview Schedule for Children (C-DISC; 40) and the Childhood Interview for Borderline Personality Disorder (CI-BPD; 41). Adolescents in this sample were excluded from participation if they had a diagnosis of schizophrenia or other psychotic disorder, bipolar disorder, autism spectrum disorder or an IQ < 70. The sample consisted initially of  $N = 502$  adolescent female inpatients. However,  $n = 45$  declined participation, revoked consent or did not provide consent,  $n = 38$  were excluded from participation based on study exclusion criteria and  $n = 64$  were excluded due to absent data on measures utilized in the current study. The final sample consisted of  $N = 356$  adolescents (ages 12-17,  $M = 15.18$ ,  $SD = 1.46$ ), with the following racial/ethnic breakdown: 67.7% Caucasian ( $n = 340$ ), 6% multiracial or other ( $n = 30$ ), 3.6% Asian ( $n = 18$ ), 2% Black or African American ( $n = 10$ ), .2% American Indian or Alaskan Native ( $n = 1$ ) and 20.5% unspecified ( $n = 103$ ). Based on the NIMH DISC-IV (40) conducted with adolescents at admission, 53.6% of the sample met criteria for an anxiety disorder, 51.8% met criteria for a depressive disorder, 31.5% met criteria for an externalizing disorder, 9.4% met criteria for an eating disorder, 7.2% met criteria for a bipolar disorder, and 8% met criteria for a substance use disorder. 35.3% of the sample met diagnostic criteria for BPD. All study assessments were completed in private within two weeks of admission and were administered by trained research coordinators and/or doctoral-level clinical psychology students.

The second sample consisted of healthy adolescents recruited from the community through a number of collaborative sources between September of 2013 and October of 2014. Parents provided informed consent for adolescents to participate and all teens were also approached to provide assent. To

be included in the current study, adolescents had to be female, demonstrate proficiency in English, and be between the ages of 12 and 17. Adolescents in this healthy sample were excluded from participation if they did not meet these inclusion criteria or if they demonstrated significant symptoms of psychopathology as indicated on the Brief Problem Monitor – Parent Report (42) or study interviews (i.e. CI-BPD). The healthy control sample consisted of  $N = 223$  healthy adolescents approached to participate,  $n = 89$  adolescents were male or their gender was not reported and were excluded from the current study. Of the remaining  $n = 134$  adolescents,  $n = 2$  were 18 years of age and  $n = 3$  met criteria for BPD based on the CI-BPD, and were excluded from data analysis in the current study. The final sample consisted of  $N = 129$  adolescents (ages 12-17,  $M = 15.32$ ,  $SD = 1.17$ ), with the following racial/ethnic breakdown: 36.4% Hispanic ( $n = 47$ ), 34.1% Asian ( $n = 44$ ), 21.7% Black or African American ( $n = 28$ ), and 7.8% Caucasian ( $n = 10$ ).

All procedures in the current study were approved by the appropriate human subject's review committees.

### Measures

**Mentalizing.** The Child Eyes Test (CET; 37) is an experimental task used to assess explicit-controlled mentalizing in children and adolescents. The task was adapted from the Reading the Mind in the Eyes Test (43) to contain developmentally appropriate vocabulary. One at a time, participants are presented with 28 black and white photographs centered on the eye region of different faces. They are then instructed to select one word which best describes the emotion the person in the photo is experiencing out of four answer choices. For each picture presented, only one answer choice is correct and its position is randomized in the answer bank. Correct answers on the CET are scored as a "1" and incorrect answers are scored as a "0". All 28 items of the CET are summed to produce a total score, such that higher scores are indicative of better emotion recognition or mentalizing.

The Movie for the Assessment of Social Cognition (MASC; 30) is a reliable tool for assessing the implicit mentalizing abilities of adolescent samples (32, 44). The MASC is movie-based task consisting of a 15-minute film with 48 multiple choice questions about the film dispersed throughout. When the film stops, participants are presented with one or more questions about the content of the film or the characters mental states (i.e. their thoughts, feelings, motivations, intentions). For each question, participants are given four answer choices. Each set of answer choices contains one of the following different subtypes of implicit mentalizing: an

accurate mentalizing response, a non-mentalizing response, a hypermentalizing (or over mentalizing) responses and a hypomentalizing (or under mentalizing) response. Participants' answers on the MASC are summed into one of four subscales: the total correct subscale, the no mentalizing subscale, the hypermentalizing subscale or the hypomentalizing subscale. In this way, a participant who selects predominantly hypermentalizing answers, for example, will have a higher hypermentalizing score than any other scale. In the current study, all four subscales of the MASC were utilized in analyses.

**Anorexia nervosa.** The Diagnostic Interview Schedule for Children – Computerized Version (NIMH DISC-IV; 40) is a structured clinical interview for DSM-IV Axis 1 diagnoses in children and adolescents ages 9-17. The DISC-IV can be administered to either parents or children and the interview has demonstrated adequate validity and test-retest reliability in previous youth samples (40). The computerized DISC-IV provides users with diagnostic reports indicating the presence or absence of each disorder assessed as well as the total number of symptoms endorsed for each disorder. The current study only utilized DISC-IV youth report results related to AN. Results of the youth-report DISC-IV for each participant were coded in the dataset to indicate the presence or absence of AN (0 = no diagnosis, 1 = positive diagnosis) and the total number of AN symptoms endorsed. In the current study, only adolescents in sample one (the inpatient sample) completed the DISC-IV as adolescents in sample two (the healthy sample) were screened for the presence of psychopathology prior to participation. This interview has been used to evaluate the severity of AN in our sample by using the number of AN symptoms that participants have as an index of severity.

**Borderline personality.** The Childhood Interview for DSM-IV Borderline Personality Disorder (CI-BPD; 41) is a semi-structured interview consisting of nine sections which correspond to each of the nine symptoms of BPD. The CI-BPD was adapted from the Diagnostic Interview for Personality Disorders (DIPD; 45) to assess for BPD in youth. Modifications made to the DIPD included changes to its content and scoring to ensure that it was developmentally appropriate. Each section of the interview has several questions designed to elicit responses and examples, which allow the interviewer to assess for a specific BPD symptom. After completion, each section is rated by the interviewer on a 0 – 2 scale where 0 suggests the individual does not experience the symptom, 1 indicates the

symptom is probably present but that not enough information was provided to be certain and 2 indicates that the symptom is definitely present. On the CI-BPD, a diagnosis of BPD requires that at least five sections of the interview be rated a 2. In the current study, adolescents in both sample one and two completed the CI-BPD. In sample one (the inpatient sample), diagnostic agreement between raters was moderate ( $\alpha = .523, p < .001$ ). In sample two (the healthy sample), diagnostic agreement between raters was not calculated as adolescents were excluded from participation if they met diagnostic criteria for BPD on the CI-BPD. Like in the case of AN, we have used the number of BPD symptoms endorsed as an index of severity for BPD.

The Borderline Personality Features Scale for Children (BPFS-C; 46) is a 24-item, self-report measure of BPD symptoms adapted from the borderline subscale of the Personality Assessment Inventory (PAI; 47). Each item on the BPFS-C is rated on a 5-point Likert scale with higher scores indicating greater pathology. The BPFS-C results in a total score ranging from 24 to 120. Prior research has demonstrated adequate internal consistency and construct validity in samples of adolescent inpatients (48) and convergent and concurrent validity in healthy adolescent samples (49, 50). In the current study, the total score of the BPFS-C was utilized in correlational analyses as a dimensional assessment of BPD symptomology. The BPFS-C demonstrated good internal consistency in the clinical sample ( $\alpha = .86$ ) and excellent internal consistency in the healthy sample ( $\alpha = .90$ ).

### **Data analysis**

First, adolescents recruited from the same hospital were divided into four groups based on their diagnoses on the DISC-IV and the CI-BPD: 1) adolescents who met criteria for AN and not for BPD, 2) adolescents who met criteria for BPD and not for AN, 3) adolescents who met criteria for both AN+BPD, and 4) adolescents who met criteria for other psychiatric disorders (PCs). A fifth group included in analyses consisted of the healthy adolescents (HC) recruited in sample two. Kruskal-Wallis tests were conducted to test whether these five groups were significantly different in terms of their subscale scores on the MASC and their total number of correct answers on the CET. This test was chosen for group comparisons instead of analysis of variance (ANOVA) because of the non-parametric nature of the count scores –evaluated using the Kolmogorov Smirnov test- on the MASC and CET. Significant results found with the Kruskal-Wallis test were followed up by Mann-Whitney U tests to make pairwise comparisons while performing a post-hoc Bonferroni correction. Next, Spearman correlation

analyses were conducted to examine correlations between the CI-BPD, BPFS-C total score, AN scores (number of symptoms endorsed on youth report on the DISC-IV), CET total correct score and all MASC subscale scores within the entire clinical sample. Additionally, the same variables were analyzed using partial correlations while controlling for age, as it is an important factor underlying the development of mentalization capabilities (51), especially during the developmental period of adolescence (52).

### **Results**

Among the patients who participated in the study, 44 (12.36%) received a diagnosis of AN, 101 (28.37%) received a diagnosis of BPD and 48 (13.48%) received both AN+BPD diagnoses. The remaining 163 (45.79%) adolescent patients met criteria for neither disorder, comprising the PC group. The HC group had no psychiatric disorders. Means and standard deviations for the observed variables according to the different groups are presented in Table 1, along with the results of group comparison analyses. Groups were similar in terms of age ( $p = .796$ ).

Regarding our first aim, concerning whether AN, BPD, AN+BPD, PCs and HC groups would generally demonstrate less accurate mentalizing, according to comparison analyses on MASC and CET scores, there was only a significant difference in terms of “hypermentalizing” answers on the MASC (Table 1). No differences between CET scores were found. However, Spearman correlation analyses revealed that, both CI-BPD and BPFS scores were negatively correlated with correct answers on the MASC (Table 2). Additionally, partial correlation analyses controlling for age show similar results to the Spearman correlation analyses (Table 3).

Regarding our second aim, concerning whether specific forms of mentalizing impairments were related to BPD or AN, pairwise analyses revealed a significant difference between the BPD and HC groups in terms of “hypermentalizing” scores indicating that the BPD group evidenced higher levels of “hypermentalizing” ( $Z = -3.071, p = 0.002$ ) (Table 1). In addition, PCs scored higher levels of “hypermentalizing” than HCs ( $Z = -3.026; p = 0.002$ ). Spearman and partial correlations yielded a positive correlation between CI-BPD, BPFS, and AN scores and “hypermentalizing” on the MASC (Tables 2 and 3). In addition, there was a difference between the AN+BPD and HC groups in terms of “hypermentalizing” on the MASC which approached statistical significance after Bonferroni correction ( $Z = -2.364, p = 0.018$ ) indicating that the combined group evidenced more “hypermentalizing” than controls.

**TABLE 1.** Comparison of AN, BPD, AN+BPD, PC and HC in terms of MASC and CET

	HC (1) M (SD)	BPD (2) M (SD)	AN (3) M (SD)	AN+BPD (4) M (SD)	PC (5) M (SD)	Kruskal Wallis H	p	Post hoc (adjusted p = 0.008)
MASC Correct answer	33.22(4.151)	32.14(4.828)	33.31(4.750)	32.78(4.536)	32.93(4.615)	2.872	.580	2 > 1; 5 > 1
MASC Hypermentalizing	6.17(2.857)	7.62(3.440)	7.19(3.878)	8.03(4.116)	7.36(3.484)	14.007	.007	
MASC Hypomentalizing	3.69(2.618)	3.25(2.072)	2.86(1.933)	2.94(2.083)	3.04(2.013)	5.720	.221	
MASC No mentalizing	1.91(1.635)	1.99(1.811)	1.64(1.428)	1.25(1.273)	1.67(1.517)	6.904	.141	
CET	20.93 (2.550)	20.59(2.915)	21.32(1.959)	20.95(2.280)	20.75(2.417)	2.080	.721	
N	129	101	44	48	163			

Note. HC = Healthy Control; BPD = Borderline Personality Disorder; AN = Anorexia Nervosa; PC = Psychiatric Control; M = Mean; SD = Standard Deviation; MASC = Movie Assessment for Social Cognition; CET = Children’s eye test.

**TABLE 2.** Spearman correlations

	CI-BPD	BPFS-C	YCDISC (Anorexia)	CET	MASC Correct answer	MASC Hyper- mentalizing	MASC No mentalizing	MASC Hypo- mentalizing
CI-BPD	1							
BPFS-C	<b>.580**</b>	1						
YCDISC (Anorexia)	<b>.380**</b>	<b>.311**</b>	1					
CET	-.041	-.069	.086	1				
MASC Correct answer	<b>-.121*</b>	<b>-.161**</b>	-.038	<b>.215*</b>	1			
MASC Hypermentalizing	<b>.127*</b>	<b>.220**</b>	<b>.117*</b>	<b>-.171**</b>	<b>-.805**</b>	1		
MASC No mentalizing	.034	-.016	-.046	-.018	<b>-.488**</b>	.095	1	
MASC Hypomentalizing	.027	-.006	-.083	<b>-.177**</b>	<b>-.501**</b>	.010	<b>.183**</b>	1
Age	-.034	-.086	.053	.085	<b>.318**</b>	<b>-.264**</b>	<b>-.142*</b>	<b>-.155**</b>

Note. CI-BPD = Childhood Interview for DSM-IV Borderline Personality Disorder; BPFS-C = Borderline Personality Features Scale-Youth; YCDISC = Youth CDISC; CET = Children’s eye test; MASC = Movie Assessment for Social Cognition \*\*\* p < .001, \*\* p < .01, \* p < .05

**TABLE 3.** Partial correlations

	CI-BPD	BPFS-C	YCDISC (Anorexia)	CET	MASC Correct answer	MASC Hyper- mentalizing	MASC No mentalizing	MASC Hypo- mentalizing
CI-BPD	1							
BPFS-C	<b>.567***</b>	1						
YCDISC (Anorexia)	<b>.401***</b>	<b>.324***</b>	1					
CET	-.030	-.036	.090	1				
MASC Correct answer	<b>-.117*</b>	<b>-.144*</b>	-.045	<b>.208***</b>	1			
MASC Hypermentalizing	<b>.135*</b>	<b>.214***</b>	<b>.138*</b>	<b>-.162**</b>	<b>-.785***</b>	1		
MASC No mentalizing	.042	-.005	-.056	-.010	<b>-.463***</b>	.045	1	
MASC Hypomentalizing	-.010	-.051	-.097	<b>-.170**</b>	<b>-.482***</b>	-.041	.171	1

Note. CI-BPD = Childhood Interview for DSM-IV Borderline Personality Disorder; BPFS-C = Borderline Personality Features Scale-Youth; YCDISC = Youth CDISC; CET = Children’s eye test; MASC = Movie Assessment for Social Cognition \*\*\* p < .001, \*\* p < .01, \* p < .05

## Discussion

Impaired mentalizing, i.e., difficulties in understanding oneself and others in terms of mental states, has been proposed as one of the main underlying mechanisms for psychological disturbances in various psychiatric disorders such as AN and BPD, mainly among adults (11, 13). By the administration of two experimental instruments that assessed explicit and implicit mentalizing abilities — that is, the widely used CET (37) and the ecologically valid task MASC (30)—, the present work examined the understudied question of impaired mentalizing among inpatient adolescents with diagnoses of AN and BPD. Also, this was the first study to explore mentalizing abilities among a sample of adolescents presenting with both disorders. Our results revealed that hypermentalizing was reported by inpatient adolescents with BPD, with AN+BPD, although to a lesser extent, and with other psychiatric disorders. Unexpectedly, in the AN group, group comparison analysis did not reveal any significant impairment in mentalizing although correlation analyses revealed a significant, positive correlation between AN symptoms and hypermentalizing.

In line with prior research, adolescents with BPD reported impaired implicit mentalizing relative to healthy controls; specifically, hypermentalizing or excessive theory of mind, which is consistent with previous research with adolescent inpatients with BPD (22, 31, 33). Although the PC group also demonstrated greater hypermentalizing relative to the HC group, possibly indicating that such a mentalizing impairment may be transdiagnostic and simply associated with greater symptom severity (53), when taking a dimensional approach, positive significant correlations emerged between BPD symptoms and hypermentalizing. This suggests that hypermentalizing may contribute to worse personality functioning and do point to the relevance of hypermentalizing for personality disorder (54). Our findings suggest that adolescents with BPD traits tend to make overly complex inferences and over-interpret social cues, signs, and mental states that are often unjustified (16). Here, it is noteworthy to consider that adolescence represents a developmental stage characterized by rapid hormonal changes, a peak in the prevalence of internalizing and externalizing disorders, emotional lability, and identity confusion (55). However, characteristics of hypermentalization (e.g., excessive inference, often quite distorted, and sometimes paranoid) are also frequent precipitants of affect dysregulation, self-harm, and suicidal behaviors for individuals suffering from BPD (45). Therefore, hypermentalizing is an important marker for distinguishing emerging BPD from adolescent turmoil (33) and, as claimed by mentalizing

researchers (13, 16), plays a central role in the developmental pathway leading to BPD in adolescents.

Another finding of the present study that approached statistical significance is that higher hypermentalizing relative to HC was also reported among adolescents with both disorders, AN+BPD, although to a lesser extent than the group with a single diagnosis of BPD. This finding could indicate that impaired implicit mentalizing might be present among patients with comorbid BPD and AN binge-eating/purging type, characterized by impulsivity, sensation seeking, interpersonal sensitivity, affective dysregulation, and stress reactivity (56, 57). Our results also revealed a significant, although small, positive association between hypermentalizing MASC scores and AN symptoms, which is contrary to our expectations and prior evidence showing that adolescents with AN tend to report less mentalizing or hypomentalizing (25, 27). Taken together, it seems that our results may be partially explained by either the influence of putative restrictive (not binge-purging type) anorexic traits present in inpatients with AN in reducing hypermentalizing scores among the AN+BPD group compared to the BPD group, and/or most importantly by the presence of more symptoms of BPD than AN in this inpatient group. Nevertheless, as this is the first study in which mentalization was examined in a sample of adolescents presenting with both disorders, future researchers may also consider the influence of the duration and severity of AN symptoms on mentalization to provide stronger support for this hypothesis.

On the other hand, based on our group comparison analyses, it seems that adolescents with a diagnosis of AN may not experience impairments in their mentalizing ability (neither implicit nor explicit) relative to other groups. We did find a significant, positive correlation between AN symptoms and hypermentalizing answers on the MASC, however, as mentioned above it should be interpreted with caution given its small effect size. The fact that our AN group did not show mentalizing difficulties could be explained, at least in part, in several ways. First, mentalizing problems in AN could be explained by the co-occurrence with other mental disorders, such as personality pathology and more particularly, as suggested by our results, by the presence of comorbid BPD. Second, it could be possible that the different results with respect to previous studies are due to the measurements used. In fact, this is the first study that has measured mentalizing broadly by using the MASC and CET in inpatient adolescents with AN. The findings of the few studies that have investigated mentalizing abilities in adolescents with AN thus far largely

depend on the instruments applied. Taken together, it seems that prior research did not fully explore the concept of “mentalizing” taking into account the different dimensions of the construct (39). For instance, previous studies supporting impaired mentalizing among adolescent samples with AN measured mentalizing using emotion recognition tasks (24, 25, 58) such as the set of images to assess facial recognition developed by Matsumoto & Ekman (59). Other studies yielded inconsistent results based on instruments with relatively poor validity and reliability (23). For example, some did find significant differences between the clinical AN sample *versus* healthy group (26, 60), while others did not find differences (28, 61). In this regard, it has been suggested that the performance of patients with AN is significantly worse than that of healthy controls on tasks assessing emotional functioning, whereas AN patients’ performance is comparable to that of healthy controls on tasks that tap into social cognition (62). In consequence, there is a need for future studies among adolescent samples with AN to use more experimental measures of mentalization for children and adolescents in order to, not only determining the loss of capacity *per se* based on external features of others, but also to identifying specific maladaptive social-cognitive processes (e.g., hypermentalizing) that requires more reflection and taps the interior mental world of the other such as the MASC (22). Third, it could also be hypothesized that the lack of significant results might be biased by other characteristics present in patients with AN. For instance, AN is more common among females characterized by high levels of intelligence (63), perfectionism (64) and academic achievement (65) — characteristics that could make adolescents of this group better test-performers. Relatedly, it has even been suggested that IQ may predict performance on the Reading the Mind in the Eyes test in AN patients (66). However, these suggestions are speculative and further studies would be needed to examine such hypotheses. Fourth, another variable that may contribute to the seemingly unimpaired mentalizing of the AN group might be the duration of their illness. For instance, Bentz et al. (67) found that adolescents with first-episode AN performed equally well or even better than controls in tests of social cognition. However, they also examined social cognition among a sample of recovered AN patients and they did find deficits in social cognition. Schulte-Rüther et al. (28) did not find significant differences between groups, but interestingly, as they also used fMRI during the mentalizing tasks, they observed reduced activation in the medial prefrontal cortex (a crucial brain region for mentalizing). Harrison et al. (68) suggested that deficits in mentalizing abilities may be secondary to severe weight loss and the

starvation effects associated with AN in the long term. Thus, it is plausible that mentalizing impairment could already be present in the early stages of AN or at a sub-clinical level—presumably in the form of hypermentalizing—, but previous studies did not detect this form of impairment at this early stage. In this regard, our findings might point to chronicity as a key variable in mentalizing ability in AN and might explain why mentalizing impairment is over-represented in samples of adults with AN (usually with onset in adolescence). Nevertheless, prospective research is needed to verify such hypotheses.

### ***Strengths and limitations***

The results of our study should be interpreted in the context of its strengths and limitations. One of the main strengths of our study was the inclusion of an inpatient sample of adolescents presenting BPD, AN, and AN+BPD disorders. We analyzed for the first time mentalizing in a comorbid sample of adolescents and we included psychiatric and healthy control groups. Alongside questionnaires and interviews, this is the first study that has measured mentalizing abilities among AN adolescent patient using two well-validated experimental tasks. Especially relevant is the inclusion of the ecological measure MASC as it overcomes a major limitation of previous research that focused mainly on specific traits of mentalizing (as a simple variable) instead of understanding mentalizing as a heterogeneous and multidimensional construct.

The present study is limited by its small clinical sample size and by the inclusion of only female adolescents who were mostly Caucasian, and from a private psychiatric hospital. Therefore, our results must be viewed with caution and cannot be generalized to all populations. Future studies should expand our research by using the MASC among adolescent samples with these and other psychiatric disorders, including males. This study was limited also by its cross-sectional nature; therefore, we could not identify predictor variables. It would be interesting for future studies to examine the evolution of mentalizing ability throughout adolescence and its influence on the development of psychiatric symptoms. Moreover, based on our analyses, we found somewhat mixed support for the specificity of hypermentalizing to BPD features. Future studies should continue to elucidate this relationship in the context of other psychiatric disorders using a variety of methodological and analytical tools. Finally, we did not test a model including the role of insecure attachment as a risk factor for the development of impaired mentalizing. Future research should validate empirically such a

model for eating disorders presenting comorbidity with BPD.

### **Clinical implications**

Our findings suggest that hypermentalizing represents a potential therapeutic target and an important early target for intervention that could influence the developmental trajectory of BPD. Moreover, clinicians should be aware that inpatients with the co-occurrence of AN and BPD may present impaired mentalizing as well. In consequence, addressing hypermentalizing should be a major component in the treatment of this population. Concretely, Mentalization-Based Therapy has been proven to be a very helpful treatment addressing hypermentalizing in a sample of inpatient adolescents with BPD (22). As adolescent inpatients with hypermentalizing may be in a state of over-certainty, high arousal, and mentalizing dominated by affect, interventions should include increasing the focus on more controlled and cognitive mentalizing. Also, therapists should practice empathic validation with the patient's subjective experience in order to decrease the focus on the attributions they are making to other's minds (69). Thus, the current study invites further investigation into the efficacy of mentalization-based treatments for application in adolescent inpatients, specifically, when presenting with a BPD diagnosis and co-occurring AN symptoms.

### **Conclusion**

The present findings suggest that female adolescent inpatients with BPD and AN+BPD tend to hypermentalize and highlights the importance of adapting existing treatments for these comorbid conditions. Further prospective research should explore mentalizing using the CET and MASC among adolescents with AN, taking into account the potential influence of temporality and severity of the disorders' symptoms.

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