



Research Paper

Clinical characterization of coexisting ADHD symptoms in a sample of adults with cyclothymia: A preliminary observational study

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ABSTRACT

Background: Cyclothymia seems to be often associated with coexisting ADHD symptoms, although this comorbidity is understudied. Emotional dysregulation is a core symptom of both conditions.

Methods: Adult subjects with cyclothymia were consecutively enrolled at the outpatient service of the Second Psychiatry Unit of the Pisa University Hospital (Italy). Screening for ADHD was performed using the Adult ADHD Self-Report Scale (ASRS). We analyzed differences in sociodemographic and clinical characteristics between subjects with and without ADHD symptomatology.

Results: Of the total sample of 107 subjects, 43 % screened positive for ADHD. ADHD+ subjects were significantly younger than ADHD- subjects, had a lower level of education, a higher prevalence of psychiatric comorbidity, and a more frequent family history for ADHD and alcohol use disorder. In addition, ADHD+ subjects scored higher than ADHD- subjects on the affective instability, negative emotionality, and emotional impulsivity subscales of the RIPOSt-40 questionnaire, as well as on the 40-item version of Reactivity, Intensity, Polarity, and Stability questionnaire (RIPOSt-40) total score. They also showed a stronger association with the cyclothymic and depressive subscales of the Temperament Evaluation of Memphis, Pisa, Paris, and San Diego (TEMPS-M) scale.

Limitations: the small sample size, the cross-sectional nature of the study, the use of self-report questionnaires, and the use of a screening test to assess comorbidity with ADHD symptomatology.

Conclusions: ADHD symptomatology is very common in cyclothymic individuals, and emotional dysregulation blurs the diagnostic boundaries between the two disorders. Several clinical features suggest the need for systematic evaluation of ADHD in patients with cyclothymic disorder.

1. Introduction

In the DSM-5, cyclothymic disorder belongs to the bipolar spectrum of mood disorders and is defined by the presence of at least 2 years of both hypomanic and depressive periods that never meet the criteria for a full-blown affective episode (American Psychiatric Association, 2013). Although cyclothymia is considered a very common psychiatric disorder, comprehensive epidemiologic data are lacking. In clinical samples, it occurs more frequently in women than in men, and the incidence ranges from 0.4 % to 13 %, depending on the criteria used (Van Meter et al., 2012).

The way of current diagnostic classifications to describe cyclothymia only in terms of alternating depressive and hypomanic symptoms in an attenuated form completely neglects psychological aspects, behavioral

symptoms, and important clinical features such as excessive mood reactivity, impulsivity, and anxiety, leading to a limited understanding of the disorder and, consequently, its underdiagnosis.

Actually, the core features of cyclothymia are emotional dysregulation (ED), i.e., rapid oscillations of intense affect with a difficulty in regulating these oscillations or their behavioral consequences, and marked mood reactivity, whether in terms of intensity and duration. Indeed, as early as adolescence, cyclothymic individuals report a stable trait of exaggerated sensitivity to both positive or negative external stimuli of psychological, environmental, chemical, and physical nature (Perugi et al., 2015). Mood reactivity and instability are invariably associated with a number of psychological and behavioral consequences that may be the main complaints or symptoms for many of these individuals.

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Some authors have suggested that cyclothymia should be considered a distinct neurodevelopmental disorder, and that the cyclothymic disposition should be viewed from a developmental perspective as the result of very complex interactions between constitution and environment (Perugi et al., 2017). This hypothesis is empirically strengthened by the observation that ED is frequently found in a broad range of other neurodevelopmental disorders, including attention-deficit/hyperactivity disorder (ADHD), autism spectrum disorders, Tourette syndrome, and intellectual disability.

Cyclothymia often occurs in comorbidity with other psychiatric disorders, including ADHD, which is the most commonly diagnosed neurodevelopmental disorder and is characterized by inattention, hyperactivity, and impulsivity (American Psychiatric Association, 2013). ED is a key feature in most individuals with ADHD and has been suggested as one of the main symptoms of the disorder, especially in adult populations (Barkley, 2015; Hirsch et al., 2018; Skirrow and Asherson, 2013).

The many similarities between ADHD and cyclothymia, such as the trait nature, early onset, psychopathological features (e.g., ED and impulsivity), and comorbidity with numerous other psychiatric complications (e.g., eating and sleep disorders), make it difficult to clinically recognize comorbidity between the two disorders as well as differential diagnosis. This also complicates the pharmacological treatment of ED, which responds better to mood stabilizers or stimulants, depending on the underlying psychopathology (Perugi and Popovic, 2010; Shaw et al., 2014).

The comorbidity of cyclothymia and ADHD, although hypothesized to be very common, has not been well studied in the literature. Overall, a higher incidence of bipolar spectrum disorders has been shown in ADHD subjects, both in adulthood and in childhood (Kessler et al., 2006; Masi and Gignac, 2015), and the association between bipolar disorder and ADHD appears to be even stronger when cyclothymic temperament is present (Syrstad et al., 2020). An indication of the biological link between the cyclothymia and ADHD may come from the preliminary results of a study in which lithium salts showed a statistically significant improvement in ADHD symptoms in a small population of adult subjects (Dorrego et al., 2002).

In a study conducted by Landaas et al. (2012) on a Norwegian population consisting of 586 ADHD subjects and a control sample of 721 individuals, the Temperament Evaluation of Memphis, Pisa, Paris and San Diego auto-questionnaire (TEMPS-A) was administered to assess the prevalence of cyclothymic temperament and to evaluate its impact on functioning and clinical presentation. ADHD subjects showed a higher prevalence of the cyclothymic temperament than the control population. In addition, ADHD subjects who scored positive for cyclothymic temperament had lower levels of educational and occupational attainment, higher prevalence of psychiatric comorbidities, and greater familiarity with psychiatric disorders than both the general population and ADHD subjects who scored negative for cyclothymic temperament.

Another study compared an adult population of individuals diagnosed with cyclothymia with a population diagnosed with ADHD. High comorbidity was found between the two disorders and a high incidence of ED, measured by the Reactivity, Intensity, Polarity and Stability Questionnaire (RIPoSt-40), in both conditions (Brancati et al., 2021). An interesting finding was that patients with cyclothymia appeared to be more likely to be female, to have a higher level of education, and to have lower rates of substance use disorders than subjects with ADHD or with cyclothymia and ADHD comorbidity. In addition, individuals with cyclothymia showed greater familiarity with psychiatric disorders (major depressive disorder, panic disorder, suicide) than individuals with ADHD, and were also characterized by fewer hyperthymic temperamental traits, higher depressive and anxious dispositions, and greater negative emotionality. Finally ADHD-cyclothymia individuals scored significantly higher on the affective instability subscale of the RIPoSt-40 than ADHD individuals without cyclothymia.

The aim of this naturalistic preliminary study was to assess the

presence of ADHD symptoms in a population of cyclothymic subjects and to investigate differences between the populations with (ADHD+) and without (ADHD-) positive screening for ADHD. In addition to clinical and demographic data, we aimed to compare ED and affective temperament between the two groups of patients using specific self-report questionnaires.

2. Materials and methods

In this naturalistic study, subjects were consecutively enrolled at the outpatient service of the Psychiatry 2 Unit of Santa Chiara University Hospital in Pisa (Italy) between March 2018 and December 2022.

Adult subjects (age ≥ 18 years) who met criteria A-B and D-G for cyclothymic disorder of the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) (American Psychiatric Association, 2013) were included in the study. Exclusion criterion C was not applied; therefore, a history of lifetime major mood episodes, either depressive or (hypo)manic, did not exclude the diagnosis. This approach allowed the inclusion of subjects with a cyclothymic background, otherwise diagnosed with major depressive, bipolar II, or bipolar I disorder. Furthermore, considering cyclothymia on a continuum between a temperamental predisposition and a manifest disorder that adversely affects cognitive, behavioral, and relational aspects, in accordance with Akiskal and Mallya's criteria for cyclothymic temperament (Akiskal and Mallya, 1987), an early onset of cyclothymia (< 21 years) was considered mandatory to exclude individuals with iatrogenic or residual mood swings. Participants with intellectual disability and/or schizophrenic spectrum disorders according to DSM-5 criteria were excluded from the samples.

Sociodemographic variables, lifetime psychiatric comorbidity according to DSM-5 criteria, and current psychopharmacological treatment were collected in a single consultation from participating psychiatrists. Screening for comorbid ADHD symptomatology was conducted using the Adult ADHD Self-Report Scale (ASRS), which is a standardized and well-validated symptom checklist with 18 items, each ranging from 0 to 4. A score of 14 or higher on the first 6 items is considered indicative of ADHD.

Emotional dysregulation was measured using the Reactivity, Intensity, Polarity, and Stability questionnaire in its validated 40-item version (RIPoSt-40) (Brancati et al., 2019). Items rated on a Likert scale ranging from 1 ("never") to 6 ("always") were summed to compute four subscales scores, assessing affective instability, positive and negative emotionality, and emotional impulsivity, and a second-order negative emotional dysregulation score made up of affective instability, negative emotionality, and emotional impulsivity subscales. Affective temperamental traits were measured by means of the Temperament Evaluation of Memphis, Pisa, Paris, and San Diego (TEMPS-M) (Erfurth et al., 2005; Fico et al., 2019), a self-evaluation form of 35 items coded on a 5-point Likert scale (from absent to very much) and including five subscales, one for each affective temperamental disposition, namely depressive, cyclothymic, hyperthymic, irritable, and anxious. Finally, separation anxiety was assessed through the Adult Separation Anxiety Symptom Questionnaire (ASA-27) (Manicavasagar et al., 2003), a self-report measure with 27 items, rated on a scale from 0 (this never happens) to 3 (this happens all the time).

Descriptive analyses were reported in terms of mean and standard deviations for continuous variables and number and percentages for categorical ones. Demographic and clinical variables as well as RIPoSt-40, TEMPS-M and ASA-27 scores were compared among subjects with and without comorbid ADHD symptoms. Comparative analyses were conducted using chi-square test for categorical variables and Student's *t*-test for continuous variables. The significance level in all statistical tests was set to 0.05. A logistic regression model was used to identify the predictive value of clinical characteristics on the presence of comorbid ADHD symptomatology. An alpha of 0.05 in the univariate comparison was used as a cutoff for inclusion of a variable in the regression model.

All the statistical analyses were performed using IBM SPSS Statistics for Mac, Version 25.0 (SPSS Inc., Chicago, IL, USA).

The study was conducted in accordance with the World Medical Association Code of Ethics (Declaration of Helsinki), and the study protocol was approved by the Ethical Committee of the University of Pisa on 15 March 2018 (N. 12,712,PERUGI). All subjects provided written informed consent to participate in the study.

3. Results

Overall, 147 subjects with cyclothymia were recruited. The present study focuses on the 107 subjects who underwent a screening assessment for ADHD using the ASRS. The mean age of the sample was 35 years and more than 80 % of the subjects were women. Forty-six (43.0 %) subjects screened positive for adult ADHD.

ADHD+ subjects were significantly younger than subjects without ADHD while there were no differences in sex distribution (Table 1). Overall, comorbidity with other psychiatric disorders was found in more than 75 % of the individuals. ADHD+ subjects showed a higher prevalence of comorbidity with any lifetime psychiatric disorder than the others, although the prevalence of individual diagnoses did not differ between the two subjects groups. Actually, comorbidity with eating disorders (mainly represented by bulimia nervosa and binge eating disorder) was almost twice as high in ADHD+ individuals compared with ADHD- cyclothymic subjects, but the difference did not reach statistical significance, probably due to the relatively small sample size.

Table 1
Comparison of clinical variables between cyclothymic subjects (n = 107) with and without comorbid ADHD.

	ADHD- (n = 61, 57.0 %)	ADHD+ (n = 46, 43.0 %)	χ^2/t	OR (95 % C. I.)	p
Age (mean, sd)	38.02 (13.96)	30.70 (11.79)	2.867	–	0.005
Female sex (n,%)	50 (82.0 %)	37 (80.4 %)	0.041	1.11 (0.42–2.94)	0.840
Age at first psychiatric treatment	27.72 (11.58)	24.26 (11.53)	1.484	–	0.141
Lifetime psychiatric comorbidities (n,%)					
Bipolar Disorder	44 (72.1 %)	29 (63.0 %)	0.999	2.11 (1.03–4.33)	0.318
Anxiety Disorders	32 (52.5 %)	23 (50.0 %)	.063	0.91 (0.42–1.95)	0.801
Eating Disorders	16 (26.2 %)	19 (41.3 %)	2.708	1.98 (0.87–4.49)	0.100
Substance/Alcohol use disorders	19 (31.1 %)	19 (41.3 %)	1.181	1.56 (0.70–3.46)	0.277
Suicidal attempts	14 (23.0 %)	14 (30.4 %)	0.760	1.47 (0.62–3.49)	0.383
Any lifetime psychiatric comorbidity	47 (77.0 %)	43 (93.5 %)	5.297	4.27 (1.15–15.89)	0.021
Current psychopharmacological treatment (n,%)					
Lithium	44 (72.1 %)	35 (76.1 %)	0.212	1.23 (0.51–2.96)	0.645
Anticonvulsants	43 (70.5 %)	25 (54.3 %)	2.951	0.50 (0.22–1.11)	0.086
Antidepressants TCA	22 (36.1 %)	15 (32.6 %)	0.139	0.86 (0.38–1.93)	0.710
Antidepressants SSRI/SNRI	25 (41.0 %)	22 (47.8 %)	0.498	1.32 (0.61–2.86)	0.480
Antipsychotics	19 (31.1 %)	17 (37.0 %)	0.396	1.30 (0.58–1.91)	0.529
Benzodiazepines	12 (19.7 %)	8 (17.4 %)	0.090	0.86 (0.32–2.31)	0.764

Abbreviations: ADHD, Attention Deficit/Hyperactivity Disorder; SNRI, Serotonin and Norepinephrine Reuptake Inhibitors; SSRI, Selective Serotonin Reuptake Inhibitors; TCA, Tricyclic Antidepressants.

Bold values indicate statistical significance (p < 0.05).

Psychopharmacological treatments were substantially similar between the two groups of subjects and were mainly based on the use of mood stabilizers (lithium salts and anticonvulsants), in combination with antidepressants (most frequently SSRI/SNRI), antipsychotics, and benzodiazepines. Stimulant drugs were prescribed in almost 30 % of ADHD+ cyclothymic subjects.

As expected, ADHD+ cyclothymic subjects showed significantly lower educational attainment as compared with ADHD- individuals: high-school or university educational level was observed in 51 (83.6 %) ADHD- participants versus 30 (65.2 %) ADHD+ subjects (OR = 0.37; 95 % C.I. = 0.15 – 0.91; p = 0.028).

Compared to ADHD- subjects, ADHD+ subjects had a more frequent family history for ADHD (respectively, 1.9 % vs 14.6 %, p = 0.018) and alcohol use disorder (respectively, 3.8% vs 17.1 %, p = 0.030) while there were no differences in family history for mood disorders.

Among the facets of emotional dysregulation measured by RIISt-40, affective instability, negative emotionality, and emotional impulsivity were significantly more represented in ADHD+ subjects than in ADHD- individuals, while positive emotionality did not show significantly different scores (Table 2). Consequently, ADHD+ subjects scored higher on the total negative emotional dysregulation (NED) score, as well as on the total RIISt-40 score. While no significant differences were found for the hyperthymic temperamental dimension, TEMPS-M scores for depressive, cyclothymic, irritable, and anxious temperament differed significantly between the groups: subjects with cyclothymia and ADHD scored higher in all these temperamental dimensions than ADHD- subjects and showed a particularly strong association with the cyclothymic and depressive subscales. Finally, higher scores at the ASA-27 scale assessing adult separation anxiety symptomatology was found in comorbid cyclothymic subjects compared to the others.

In the multivariate logistic regression analysis, the clinical features that significantly differentiated ADHD+ subjects from ADHD- subjects were any psychiatric comorbidity, and RIISt-40 affective instability (Table 3).

4. Discussion

In our sample, nearly half of the individuals with cyclothymia tested

Table 2
Comparisons of clinical variables between cyclothymic subjects (n = 107) with and without comorbid ADHD.

	ADHD- (n = 61, 57.0 %)	ADHD+ (n = 46, 43.0 %)	t	p
Emotional dysregulation: RIISt-40 (mean, sd)				
Affective instability	39.28 (11.14)	49.35 (13.68)	4.195	<0.001
Positive emotionality	38.00 (11.37)	38.39 (9.93)	0.191	0.849
Negative emotionality	39.10 (9.93)	46.25 (9.50)	3.757	<0.001
Emotional impulsivity	27.30 (7.87)	33.72 (9.24)	3.876	<0.001
Total NED score	105.68 (24.06)	129.32 (28.08)	4.682	<0.001
Total score	143.67 (27.81)	167.71 (31.35)	4.190	<0.001
Affective temperaments: TEMPS-M (mean, sd)				
Depressive	21.97 (6.03)	25.48 (5.23)	3.148	0.002
Cyclothymic	19.68 (6.58)	25.22 (7.72)	4.000	<0.001
Hyperthymic	19.81 (5.89)	19.07 (6.27)	0.632	0.529
Irritable	17.21 (6.07)	19.93 (6.99)	2.147	0.034
Anxious	17.60 (6.10)	20.26 (6.32)	2.197	0.030
Separation anxiety: ASA-27 score (mean, sd)	51.25 (14.91)	60.88 (16.35)	3.174	0.002

Abbreviations: ADHD, Attention Deficit/Hyperactivity Disorder; ASA-27, Adult Separation Anxiety Symptom Questionnaire; TEMPS-M, Temperament Evaluation of the Memphis, Pisa, Paris and San Diego; NED, Negative Emotion Dysregulation; RIISt-40, Reactivity, Intensity, Polarity and Stability questionnaire. **Bold values indicate statistical significance (p < 0.05).**

Table 3

Multiple logistic regression of clinical features on the presence of a positive ADHD screening.

Variables in equation	Wald	p-value	OR (95 % CI)
Any psychiatric comorbidity	3.991	0.046	4.23 (1.03–17.40)
RIPoSt-40 affective instability	8.188	0.004	1.06 (1.02–1.10)
ASA-27 total score	2.840	0.092	1.02 (1.00–1.06)

Wald = 17.732, df = 1, $p < 0.001$.

Variables not included in the equation: age; RIPoSt-40 negative emotionality; RIPoSt-40 impulsivity; RIPoSt-40 total score; depressive temperament; cyclothymic temperament; irritable temperament; anxious temperament.

Abbreviations: ADHD, Attention-Deficit/Hyperactivity Disorder; ASA-27, Adult Separation Anxiety Symptom Questionnaire; RIPoSt-40, 40-item Reactivity, Intensity, Polarity, and Stability questionnaire (40-item version).

Bold values indicate statistical significance ($p < 0.05$).

positive for ADHD symptoms, which is consistent with previous studies conducted in clinical populations of cyclothymic individuals (Brancati et al., 2021) and individuals with cyclothymic temperament (Syrstad et al., 2020). This rate is even higher than the 20 % comorbidity rate between BD and ADHD found in a recent meta-analysis (Sandstrom et al., 2021).

ADHD+ cyclothymic subjects were younger than ADHD- individuals. Accordingly, it has been shown that individuals with comorbid ADHD and BD experience earlier onset of mood symptoms, greater disease burden, and reach clinical attention earlier in life than do individuals with BD alone (McIntyre et al., 2010; Perroud et al., 2014; Sadeghian Nadooshan et al., 2022).

As expected (Landaas et al., 2012), ADHD+ subjects showed significantly lower educational attainment compared to non-comorbid cyclothymic ones. As discussed in a previous article from our research group, in a complex framework in which elements of a mood disorder, ED, and executive functions deficits coexist, the latter appear to be the major negative predictors of academic performance (Brancati et al., 2021).

Overall, lifetime psychiatric comorbidity was very common in both groups of subjects, with mood disorders and anxiety disorders predominating. According to a previous study (Landaas et al., 2012), ADHD+ individuals showed a higher burden of overall psychiatric comorbidity. In particular, eating disorders, represented mainly by bulimia nervosa and binge eating disorder, were almost twice as common in ADHD+ individuals compared to non-comorbid cyclothymic subjects. These data are consistent with recent literature highlighting an important association between binge eating disorder, obesity and ADHD (Seymour et al., 2015; Weiss et al., 2020; Wentz et al., 2005). Several pathogenetic mechanisms underlying the association between obesity and ADHD have been proposed (Cortese, 2019; Cortese and Vincenzi, 2012). First, it has been argued that ADHD and obesity may share some neurobiological mechanisms involving reward pathways, response inhibition, and emotional regulation (Seymour et al., 2015). Obesity may also be considered secondary to the deficits in inhibitory control and executive function associated with ADHD. In fact, executive dysfunction may lead to disordered eating behaviors such as binge eating, bulimia, emotional hunger, or night eating (Cortese, 2019; Hanc and Cortese, 2018). In cyclothymic ADHD individuals, maladaptive eating behaviors are further facilitated by the substrate of affective instability, mood reactivity, anxiety, and impulsivity that characterizes their psychopathological profile (McElroy et al., 2005; Perugi et al., 2015).

We would have expected to find more comorbidity with substance/alcohol use disorders (SUD) in ADHD+ individuals (Brancati et al., 2021; Chen et al., 2018; Martinez-Raga et al., 2013) compared to ADHD- individuals, whereas the two groups did not differ significantly in this regard. However, a high percentage of SUD comorbidity was found in both groups (approximately one-third of the sample), with a higher rate trend is seen in the ADHD+ group. This difference may become significant as the sample size increases. Consistently, individuals with

ADHD+ have higher rates of both ADHD and alcohol use disorder in their family history.

Psychopharmacological treatments were essentially similar between the two groups of subjects and were mainly based on the use of mood stabilizers (lithium salts and anticonvulsants). In fact, according to guidelines, the treatment of ADHD comorbid with bipolar spectrum disorders usually begins with the management and stabilization of mood symptoms (CADDRA - Canadian ADHD Resource Alliance, 2020). Stimulants were prescribed in only one third of ADHD+ patients. This finding may be due to several factors. First, a proportion of the subjects had never been previously assessed for ADHD symptoms. Second, the ASRS is a screening tool for ADHD. If positive, a focused clinical examination and a structured clinical interview such as the Diagnostic Interview for Adult ADHD, second edition (DIVA 2.0) should be used to confirm the diagnosis. In such cases, however, mood stabilization should be sought first, and only if ADHD symptoms persist to a clinically significant level should ADHD-specific therapy be initiated. For this reason, stimulants or atomoxetine were prescribed at a later stage in some subjects.

As expected, both groups of subjects showed high rates of ED (Barkley, 2015; Brancati et al., 2021; Masi et al., 2021; Shaw et al., 2014). In particular, subjects with cyclothymia and ADHD symptoms showed more pronounced ED traits than ADHD- subjects on all negative components (affective instability, negative emotionality, and impulsivity), as well as the highest scores on the cyclothymic temperament subscale. Instead, the two groups showed similar characteristics of positive emotionality and hyperthymic temperament traits, whose subscale scores were lower than those found in subjects with pure ADHD in previous studies (Brancati et al., 2021; Perugi et al., 2017).

These data would support the hypothesis that the "dark" expressions of ED typical of cyclothymia, such as anxiety, depressed mood, high sensitivity, and irritability, would oppose the "sunny" characteristics of ADHD when the two disorders occur in comorbidity, resulting in a worse and more unstable emotional and affective outcome than the two conditions taken separately.

Finally, subjects with cyclothymia and ADHD scored higher on the anxiety disorder scale than subjects with cyclothymia alone. Cyclothymic individuals are known to have high levels of separation anxiety (Del Carlo et al., 2013; Perugi and Akiskal, 2002), and a relationship between this condition and ADHD has also been described (Foley et al., 2004; Golubchik et al., 2014) but data are still scarce and the relationship between the two disorders remains to be investigated, especially in adults.

5. Limitations

The results of the present study should be considered with a number of limitations. First, the relatively small sample size and the cross-sectional nature of the study must be taken into account. Second, the use of self-report questionnaires to assess ED and affective temperament may imply reliability issues, as well as the retrospective assessment of some clinical variables such as psychiatric comorbidity and family history. In addition, since the sample was clinically referred to a tertiary level service specializing in mood disorders, we must assume a selection bias. Another bias may be related to the use of the ASRS, which is a screening test for ADHD and has been shown to overestimate ADHD symptoms in certain clinical populations (Perroud et al., 2014; Prada et al., 2014; Young et al., 2015). In addition, impulsivity, psychomotricity, and executive functions may be impaired by the affective instability associated with temperament and cyclothymic disorder, as evidenced by the overdiagnosis of attention deficit disorder (ADD) in adults with cyclothymic temperament (Mauer et al., 2023). Since there is an overlap of symptoms between the two conditions, the risk that what is described in the present study is affective temperament misdiagnosed as ADHD should be taken into account. Finally, subjects may have presented with an affective episode during the enrollment visit,

potentially confounding the results of the clinical interview and self-report questionnaires.

6. Conclusions

Future studies are needed to explore the relationships between cyclothymia and ADHD in clinical samples. ED is a key feature of both syndromes, which often blurs the diagnostic boundaries between the two disorders and facilitates misdiagnosis. It is useful for clinicians to identify the elements that, when present in the individual with cyclothymia, suggest the need for further evaluation for ADHD. ADHD+ patients appear to represent a subpopulation characterized by higher rates of familiarity with ADHD, earlier onset of affective disorders, higher rates of comorbidity with other psychiatric disorders, significantly higher ED burden, poorer course of illness, and greater functional impairment. Obesity and uncontrolled eating disorders may be additional factors indicating comorbid ADHD symptomatology. Finally, cyclothymic individuals with ADHD exhibit predominantly negative emotionality and appear to lack the type of positive emotionality which is typical of patients with ADHD without comorbid cyclothymia (Christiansen et al., 2019).

Clinically, failure to recognize comorbid ADHD symptoms in cyclothymic patients results in the failure to prescribe appropriate treatment with stimulants or atomoxetine. Even in our sample, only 30 % of ADHD+ subjects received ADHD-specific treatment. On the other hand, worsening of bipolar disorder with stimulant drug treatment has been reported (Mauer et al., 2023; Wingo and Ghaemi, 2007). Therefore, guidelines recommend mood management and ADHD-specific treatment only when ADHD symptoms persist after stabilization. When the ADHD component is clinically relevant, treatment with mood stabilizers may not be sufficient to manage the clinical picture, particularly ED. These individuals may benefit from additional ADHD treatment, but further studies are needed to verify the efficacy of ADHD treatment in cyclothymic individuals and to establish a risk-benefit profile that is currently under debate.

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CRedit authorship contribution statement

Margherita Barbuti: Data curation, Formal analysis, Writing – original draft, Writing – review & editing. **Ugo De Rosa:** Investigation, Writing – original draft. **Martina Moriconi:** Investigation, Writing – original draft. **Daria Bartolini:** Investigation, Writing – original draft. **Elisa Schiavi:** Project administration, Supervision. **Giulio Perugi:** Conceptualization, Supervision, Writing – review & editing.

Declaration of Competing Interest

Giulio Perugi acted as consultant to Lundbeck, Angelini, and FB-Health. He received a scholarship/research support from Lundbeck and Angelini. He is a member of the speaker/advisory board of Sanofi-Aventis, Lundbeck, FB-Health, and Angelini. Other authors have no conflict of interest to declare.

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