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ORIGINAL PAPER

Psychiatric Comorbidities among Female Adolescents with Anorexia Nervosa

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Abstract This study investigated current comorbid Axis I diagnoses associated with Anorexia Nervosa (AN) in adolescents. The sample included 101 female adolescents treated at a psychiatric unit for primary DSM-IV diagnoses of AN. 73.3% of the AN patients were diagnosed as having a current comorbidity of at least one comorbid Axis I diagnosis, with no differences across AN subtypes. Mood disorders (60.4%) were most commonly identified, followed by the category anxiety disorders without obsessive-compulsive disorders (OCD) (25.7%), OCD (16.8%) and substance use disorders (7.9%). Two specific diagnoses differed across the two subtypes of AN. Substance use disorder was 18 times, and the category anxiety disorder without OCD was three times as likely to co-occur with AN binge-eating disorder and purging type than with AN restricting type. Clinicians should be alerted to the particularly high rate of psychiatric comorbidities in adolescents suffering from AN.

Keywords Anorexia nervosa · Adolescents · Comorbidity · Axis I

Introduction

Anorexia nervosa (AN) is a very serious psychiatric disease that affects a relatively young population and has severe consequences on the lives of many adolescents. It is characterized by refusal to maintain a normal weight, misperception of shape and weight and amenorrhea. There are two subtypes that can be distinguished: AN binge-eating/purging type (ANBP) and AN restricting type (ANR). Outcomes are in general not optimistic. Long-term follow-up studies have shown a certain tendency towards dichotomy in outcome over time: Recovery for some, and chronicity or even death for others [1]. Steinhausen [2] reviewed a 119 outcome series and found a mean percentage of mortality

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of 5%. Among the surviving patients, on average less than one-half recovered (47%), 33% improved and 20% remained chronically ill.

Comorbidity of AN with other psychiatric disorders is very high [3]. Research shows that psychiatric comorbidity is a very unfavorable prognostic feature of outcome in AN [4]. The systematic assessment of psychopathology is therefore very important for the understanding of AN pathogenesis and for the implementation of adequate treatment [5].

Eating disorders (ED) display comorbidity rates up to 73% in patients with ANR, and 82% in patients with ANBP [6]. Findings show that mood disorders, anxiety and substance use disorders are very common psychiatric disorders in adults suffering from ED [7–9]. Across studies, 20% - 98% of ED patients have mood disorders [10], 7%–65% have anxiety disorders with, most common, obsessive compulsive disorder (OCD) [11], and 6%–55% of ED patients have substance use disorders.

Regarding the relationship between ED and Axis I comorbidity, some researchers suggest that AN is an "unusual variant" of mood disorder to which females are particularly vulnerable [12]. This theory implies that mood disturbance should predate AN. Other studies suggest a causal role of starvation in the anorexia/depression association [13]. So far it remains unclear, whether it is the sole cause of depression, or whether starvation-related changes exacerbate a pre-existing predisposition [3]. Kaye et al. [8] showed that the onset of OCD, social phobia, specific phobia, and generalized anxiety disorder most commonly preceded the onset of AN. While there is some evidence suggesting a genetic predisposition to both anxiety disorders and AN [7], studies suggest that caloric deprivation plays a role in causing anxiety symptoms [14]. Regarding OCD, some studies show a more frequent occurrence in AN compared to BN [3]. The relationship between substance use disorder and AN, as well as BN, is one of the most intensely studied areas in ED. Most of the data comes from studies of females with BN and shows a strong relationship between bingeing and purging behavior and substance abuse, which is also observed in females with ANBP [15, 16]. While it is possible that a genetic predisposition to abuse alcohol may create vulnerability in certain individuals [7], other data display that there is no genetic relationship [17].

Psychiatric comorbidity associated with AN has mostly been examined in adult clinical samples. Few studies explored it among adolescents, although the onset of AN typically appears during adolescence [18]. It is assumed that investigating psychiatric comorbidity in this age group will lead to a better comprehension of the spectrum of pathology associated with AN and may enable the development of more efficient treatment methods [19]. Lewinsohn et al. [20] assessed 1710 high school students with the Schedule for Affective Disorders and Schizophrenia for School-Age Children and found that 77% of those students with ED had, in addition, at least one Axis I disorder. Again, mood disorders were the most frequent disorder, followed by anxiety disorders [21]. However, a significant amount of those findings were based on self-report measures that examined general behaviors and attitudes [21, 22]. Zaider et al. [19] used diagnostic interviews to assess ED symptomatology and psychiatric comorbidity and found that among adolescents only mood disorders were strongly associated with ED. In contrast, using the same method, McDermott et al. [18] found that anxiety-depressive symptoms were very common in children and adolescents with ED.

There are only a few studies that compared diagnostic subgroups of AN in adults and adolescents [23]. Sometimes a higher prevalence of depression was noted in adults suffering from ANBP compared to ANR [24], but all together the data remained conflicting [25].

It is likely that severity of illness, sociodemographic features and type of treatment received in connection with AN since onset of condition may also play an important role in

the associations between the type of AN and psychiatric comorbidity [10]. These variables failed to be considered in adolescence up until now.

The objective of the present study was to assess current comorbid Axis I diagnoses in adolescents with ANR and ANBP using diagnostic interviews. Furthermore, we explored the association between the two AN subtypes (ANR and ANBP) and the severity of illness characteristics, sociodemographic issues and treatment experience.

Methodology

Participants

Consecutive admission was granted to 101 female in- and outpatients aged 12.1–18.0 years (M = 15.2 years, SD = 1.5) treated at a child and adolescent psychiatric department of a major university hospital in Germany. All participants met the AN criteria outlined in the 4th edition of the DSM-IV. AN was diagnosed at baseline i.e. before treatment by the Structured Inventory for Anorectic and Bulimic Syndromes for DSM-IV and ICD-10 (SIAB-EX) [26]. Clinically experienced and trained research assistants under the supervision of the attending child and adolescent psychiatrist conducted the interview. Patients met DSM-IV criteria as follows: 71 ANR and 30 ANBP. 34.7% of the patients received medication including antidepressants and neuroleptics. The ethnic composition of the sample consisted of 94.1% Caucasians and 5.9% Mixed Ethnicity/Other.

Socioeconomic status (SES) was measured on a twelve-point scale assessing the parent's self-reported occupational status [27]. The scale places each occupation into one of twelve categories (0 = unemployed for more than 1 year), (1 = unskilled laborer, 6 = professional employed), (7 = unskilled self-employed, 11 = professional self-employed). We distinguished four SES groups: High (groups 5, 6, 10, 11 (e.g., manager, physician)), middle (groups 3, 4, 9 (e.g., electrician, nurse)), low (groups 1, 2, 7, 8 (e.g., cashier, textile machine operator)) and poverty conditions (group 0). SES was assessed by a certified child and adolescent psychiatrist or licensed doctoral-level child and adolescent psychologist. In this study SES was as follows: High SES (25.7%), middle SES (66.3%), low SES (8.0%) and poverty conditions (0%). Table 1 presents sample characteristics. All participants and their parents received detailed information about the procedure and objectives of the study. Patients could only participate in the study if they and their parents provided written informed consent. They were also given the opportunity to contact the researchers in case they had any questions. The study was approved by the Institutional Review Board.

Procedure

During a joint interview with at least one single parent, each parent provided information regarding the demographic profile of the family, family history and clinical feature related to AN. Total body height (in cm) and body mass (in kg) were measured using standard techniques, and the BMI was calculated. These measures were administered as part of the admission evaluations and the data was filled in each patient's medical chart. Exclusion criteria were an IQ under 85 and patients with schizophrenic disorders. Their IQ was determined by using the intelligence tests HAWIK-III (based on the WISC-III, adapted to the German population) and CFT 20 (Culture Fair Intelligence Test 20) [28].

Table 1 Sociodemographic and severity-of-illness in ANR and ANBP (M ± SD)

	ANR $N = 71$	ANBP $N = 30$	All patients $N = 101$	t-test or χ^2-test
Sociodemographics				
Admission age	14.8 ± 1.5	15.2 ± 1.5	15.1 ± 1.6	$t = -4.3$, $^{***}p < .001$
	Range: 12.1–17.1	Range: 12.1–18.0	Range: 12.1–18.0	
Sex (% female)	100%	100%	100%	
SES				
High SES	16 (22.5%)	10 (33.3%)	26 (25.7%)	$\chi^2 = 6.8$, $^{*}p < .05$
Middle SES	52 (73.2%)	15 (50.0%)	67 (66.3%)	
Low SES	3 (4.3%)	5 (16.7%)	8 (8.0%)	
Poverty conditions	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Ethnicity				
Caucasian	68 (95.8%)	27 (90%)	95 (94.1%)	$\chi^2 = 1.3$, $p > .05$
Mixed Ethnicity/Other	3 (4.2%)	3 (10%)	6 (5.9%)	
Severity-of-illness measures				
AN onset age	13.7 ± 1.6	13.6 ± 1.2	13.7 ± 1.5	$t = 0.5$, $p > .05$
Illness duration	0.8 ± 0.9	2.5 ± 1.3	1.3 ± 1.3	$t = -7.6$, $^{***}p < .001$
Admission BMI	15.0 ± 1.4	15.8 ± 1	15.3 ± 1.4	$t = -2.8$, $^{***}p < .001$
Intake of medication	22 (31.4%)	13 (43.3%)	35 (34.7%)	$\chi^2 = 1.3$, $p > .05$

Note: SES = Socioeconomic status; ANR = Anorexia nervosa restricting type; ANBP = Anorexia nervosa binge eating/purging type

Measures

Structured Inventory for Anorectic and Bulimic Syndromes (SIAB-EX)

The SIAB-EX for people aged between 12 and 65 years is a semi-standardized interview that assesses the prevalence and severity of specific eating-related psychopathology over the past three months according to DSM-IV diagnostic criteria [29]. It consists of 87 items and provides diagnoses of eating disorders according to ICD-10 and DSM-IV.

Internal consistency was good for five of the six components. The interrater reliability ranged from .86 to .96 [30]. All except two items were rated on a severity scale from 0 (symptom not present) to 4 (symptom very much/very severely present). The last two items were transformed to a rank order rating; one item assessed irregularities in the menses (0 = no irregularities to 3 = amenorrhea), the other item was the BMI, calculated from body height and weight. The BMI was categorized on a scale from 0 (no underweight) to 4 (very severely underweight).

Composite International Diagnostic Interview (CIDI-DIA-X, German version)

The CIDI-DIA-X [31] is a comprehensive, standardized diagnostic interview for the assessment of mental disorders according to the definitions and criteria of DSM-IV. It is intended for the use in epidemiological and cross-cultural studies as well as for clinical and research purposes. It contains 276 symptom questions; probe questions determine the

presence of a core symptom for each major psychiatric disorder. Each symptom is validated against a set of severity criteria. It is only scored as present, if it was sufficiently severe to interfere with daily life or if it requires medical attention. A positive response to a probe question leads to a more detailed investigation of the associated psychiatric symptoms. At the end of the interview an algorithm determines whether symptoms meeting severity criteria are satisfactory to meet the DSM-IV diagnosis. Individual's severity ratings were assigned to the items: 0 (negative response to the core symptom question), 1 (denotes individuals who met severity criteria for the core symptoms but did not report any associated symptoms), 2 (alludes to participants who met severity criteria for the core symptom and at least 1 associated symptom), 3 (assigned to individuals who obtained a psychiatric diagnosis according to DSM-IV). The interrater reliability, test-retest reliability and construct validity of the CIDI-DIA-X are comparable to other structured diagnostic interviews [32–34]. In the present study, clinically experienced and trained research assistants under the supervision of the attending child and adolescent psychiatrist conducted the interview.

For more powerful and meaningful statistical analyses, we reduced the sheer number of comorbidities. We combined abuse/dependence diagnoses for each substance. Mood disorders were examined without subtypes. Because OCD is quite common in those with ED [3, 11, 35], we separated OCD from any other anxiety disorder. The category somatoform disorder was excluded because only two patients received this diagnosis. Using those methods, we created four comorbidity categories (mood disorders, anxiety disorders without OCD, OCD, and substance use disorders).

In addition, chronology, quantity and type of treatment received in connection with AN since onset was assessed with a semi-structured interview. Treatment experiences were classified according to the following categories: Inpatient treatment experience, outpatient treatment experience and current inpatient treatment.

Data Analyses

Statistical analyses were performed using SPSS for Windows, release 14.0. Chi-square analyses were conducted in order to explore group differences in sociodemographics, comorbidities and type of treatment. *T*-tests were used to explore group differences in age and severity of illness. We analyzed AN subgroups in relation to Axis I comorbidities using multinomial regression. As covariates we included any socioeconomic (age, SES) or severity of illness (BMI, duration of illness, outpatient treatment experience) feature significantly related to AN subgroups in the ANOVA. To analyze the explained variance in AN depending on comorbidities, we established two regression models. The first regression model investigated AN in relation to any comorbidity. The second regression model analyzed AN in relation to the four comorbidity categories. Afterwards, we analyzed AN in relation to comorbidities using logistic regression.

Results

Table 1 shows sociodemographic and severity of illness features in both groups. Patients in the ANR group were significantly younger than patients in the ANBP group; the SES differed significantly between both subgroups. There were no significant differences in the ethnicity among AN subgroups.

Table 2 Comorbid DSM-IV Axis I diagnoses by AN

	ANR $N = 71$	ANBP $N = 30$	All patients $N = 101$	χ^2-test
Comorbid axis I diagnoses				
Any axis I disorder	48 (67.6%)	25 (83.3%)	73 (72.3%)	$\chi^2 = 2.6$, $p > .05$
Mood disorders	41 (57.7%)	20 (66.7%)	61 (60.4%)	$\chi^2 = 0.7$, $p > .05$
Anxiety disorders without OCD	12 (16.9%)	14 (46.7%)	26 (25.7%)	$\chi^2 = 9.8$, $^{**}p < .01$
OCD	12 (16.9%)	5 (16.7%)	17 (16.8%)	$\chi^2 = .001$, $p > .05$
Substance use disorder	1 (1.4%)	8 (26.7%)	8 (8.9%)	$\chi^2 = 16.6$, $^{***}p < .001$
Treatment experience				
Outpatient treatment experience	18 (25.4%)	22 (73.3%)	40 (39.6%)	$\chi^2 = 20.3$, $^{***}p < .001$
Inpatient treatment	18 (25.4%)	13 (43.3%)	31 (30.7%)	$\chi^2 = 3.2$, $p > .05$
Experience currently inpatient treatment	49 (69%)	25 (83.3%)	74 (73.3%)	$\chi^2 = 2.2$, $p > .05$

Note: SES = Socioeconomic status; ANR = Anorexia nervosa restricting type; ANBP = Anorexia nervosa binge eating/purging type; OCD = Obsessive compulsive disorder

In the severity of illness measures, patients of the ANBP group had a significantly longer duration of illness and a higher BMI compared to the ANR group. At onset and intake of medication (Table 1), there were no differences between the two subgroups in relation to age.

Table 2 shows the comorbid DSM-IV current Axis I diagnoses as well as the treatment experiences in both subgroups. Significant group differences were found in the distribution of the following comorbidity categories: Anxiety disorders without OCD and substance use disorders. Both categories were significantly more often diagnosed in the ANBP group than in the ANR group. In regards to the comorbidity categories mood disorders and OCD, there were no significant differences in those two groups. Furthermore, neither group exhibited any difference in respect of the appearance of Axis I comorbidities.

According to the treatment experiences, patients in the ANBP group had significantly more outpatient treatment experience than patients in the ANR group. There were no significant differences between the two groups in relation to the history of inpatient treatment and the current inpatient treatment.

The first regression model examining AN in relation to any Axis I comorbidities plus five covariates was significantly better than an intercept-only model: $F = 14.5$, df = 6, $p^{***} < .0001$. R^2 indicates that the number of comorbidities and five covariates collectively explain 48% of variance in AN diagnosis. Three of five covariates significant in the ANOVA continued to be significantly related to AN when controlling for number of comorbidities: Duration of illness, $F = 24.8$, df = 1, $p^{***} < .001$; outpatient treatment experience, $F = 6.8$; df = 1, $p^{*} < .05$; BMI, $F = 6.7$, df = 1, $p^{*} < .05$; age, $F = 1.6$, df = 1, $p > .05$; SES, $F = 0.7$, df = 1, $p > .05$. More importantly, logistic regression revealed that the likelihood of having any Axis I diagnosis does not differ significantly across AN subgroups [Wald = 2.1; OR = 0.8; 95% CI = 0.8–6.6, $p > .05$].

The second regression model examining AN in relation to the comorbidity categories plus five covariates was, again, significantly better than an intercept-only model: $F = 9.2$, df = 16, $p^{***} < .0001$. R^2 indicates that Axis I comorbidities and five covariates collectively explain 64% of variance in AN diagnosis. Four of five covariates significant in the ANOVA continued to be significantly related to AN when controlling for Axis I diagnosis:

Table 3 Logistic regression of Axis I comorbidity occurring together with AN

Axis I comorbidities	Odds ratio	95% CI	Overall test of effect		
			Wald χ^2	df	p value
Mood disorders	1.0	0.4–2.5	0.2	1	$p < .05$
Anxiety disorders without OCD	3.2	1.1–8.9	4.7	1	$p > .05$*
OCD	0.9	0.3–3.8	0.6	1	<.05
Substance use disorder	18.3	2.1–163.1	6.8	1	>.01**

Outpatient treatment experience, $F = 12.1$; df $= 1$, $p^{***} < .001$; duration of illness, $F = 9.4$, df $= 1$, $p^{**} < .01$; age, $F = 4.7$, df $= 1$, $p^{*} < .05$; SES, $F = 4.4$, df $= 1$, $p^{*} < .05$; BMI, $F = 3.1$, df $= 1$, $p > .05$. More importantly, logistic regression revealed that the likelihood of having any substance use disorder or anxiety disorder without OCD differs across AN subgroups, but the likelihood of having any mood disorder or OCD does not differ. Specifically, holding all other diagnostic categories and covariates constant, substance use disorders are 18 times as likely to co-occur with ANBP as with ANR and the category anxiety disorder without OCD is three times as likely to co-occur with ANBP as with ANR (Table 3).

Discussion

The present study investigated the frequency of current comorbid Axis I diagnoses among 101 adolescents suffering from AN. Among this sample, 74 adolescents (73.3%) were diagnosed as having a current comorbidity of at least one comorbid Axis I diagnosis, with no difference in the high comorbidity rate across AN subgroups. Regression analyses affirm that these very similar comorbidities express similarity across AN subgroups in the likelihood of having any comorbidity. These findings are supported by other studies on adults and adolescents, which found comorbidity rates of 73% to 82% [6, 21].

Among the current comorbid Axis I disorders in our patients, mood disorders (60.4%) were most commonly identified, followed by the category anxiety disorders without OCD (25.7%), OCD (16.8%) and substance use disorders (7.9%). These results resemble those reported by researchers who explored psychiatric comorbidities in adults suffering from AN [10, 11, 25].

Relating to sociodemographic measures, patients with ANR were younger than those with ANBP. This result correlates with the findings of other investigations which reported higher mean age in patients with ANBP [36]. Long-term studies of AN patients indicate that up to 64% of ANR patients develop binge-eating and purging behavior at a later stage [37]. Additional research should investigate the predictive factors for the development of binge-eating disorder in adolescents with ANR.

Concerning SES, ANR showed predominantly a middle SES (73.2%), some ANR had a high SES (22.5%), only a few showed a low SES (4.3%), and none demonstrated poverty conditions (0%). In contrast, only half of the ANBP patients displayed a middle SES (50.0%), one-third a high SES (33.3%), 16.7% had a low SES and none demonstrated poverty conditions (0%). An overrepresentation of high and middle SES in AN patients was also found in other studies [38], while some researchers noted an increase in the proportion of patients with a lower SES [39, 40]. Unfortunately, those studies did not explore the

differences between the two subtypes ANR and ANBP. There were no differences in the ethnic composition of both subgroups with an extremely high number of Caucasians. This result is comparable to the study of Zhang and Snowden [41] who reported that Caucasians were significantly more likely to suffer from AN than other ethnic groups.

Regarding the severity of illness features, ANR had a shorter duration of illness and a lower BMI compared to ANBP. Blinder et al. [10] compared the duration of illness in adult patients with ANR and ANBP and found likewise a longer duration of illness in ANBP. Steinhausen [2] found that the occurrence of binge-eating disorder has a negative prognostic impact and seems to delay the time of full recovery. It should be considered that the duration of illness might be related to the participant's age, since ANR are often younger than ANBP.

The fact that ANBP had a higher BMI in contrast to ANR is also supported by Vervaet et al. [42]. It is possible that the risk of developing bulimic episodes is linked to factors that have an impact on the regulation of body weight.

Concerning the treatment experience, ANBP received more outpatient treatment than ANR. From a developmental perspective, this result is not very surprising since treatment experience could be related to age and ANR are often younger than ANBP and have therefore less treatment experience. Furthermore, the difference in outpatient treatment experience could also be due to the fact that ANBP is associated with a longer duration of illness, a less favorable outcome and may therefore require more treatment options. In regards to the amount of inpatient treatment in the past and the amount of current inpatient treatment, there were no differences between the groups to be found.

Because the factors age, SES, duration of illness, BMI and outpatient treatment display significant differences among ANR and ANBP, they were controlled in the following statistical analyses. Therefore those factors cannot account for the comorbidity differences found across AN in the present sample.

Mood Disorders

We found no differences across AN subgroups with regards to the likelihood of having any mood disorders. Rates were relatively high, ranging from 57.7% (ANR) to 66.7% (ANBP). Univariate regression analysis confirmed that this similar comorbidity rate expresses similarities across AN. Even with multiple confounding variables controlled, the likelihood of having mood disorders display no differences across AN subgroups. Studies in adults suggested similar rates of depression across AN, but in the present sample, the difference between ANR and ANBP was lower. As a large number of participants were treated as inpatients, it could be anticipated that a predisposition of depressive symptoms exists in both groups.

Anxiety Disorder Without OCD

We found differences across AN subgroups in the likelihood of having anxiety disorders with rates ranging from 16.9% (ANR) to 46.7% (ANBP). Univariate regression analysis confirmed that this difference in the likelihood of having an anxiety disorder between AN subgroups is due to a higher anxiety disorder rate in ANBP. With the effect of multiple variables teased out through statistical control using adjusted odds ratios, ANBP patients were three times as likely to have at least one anxiety disorder without OCD as the ANR

subgroup. This finding in adolescents is similar to the report by Iwasaki [24], who found that ANBP adults had a significantly higher percentage of patients with a comorbidity of any anxiety disorder compared to ANR.

OCD

We found no differences across AN subgroups in the likelihood of having OCD. Rates ranged from 16.7% to 16.9% across AN subgroups. Univariate regression analysis confirmed that this similar comorbidity rate expresses similarities across AN subgroups. Even with multiple confounding variables controlled, the likelihood of having OCD displays no differences across AN subgroups. Blinder et al. [10] support this finding, while other studies on adults reported higher OCD rates for ANR [5, 36]. In those studies, a close relation between OCD and AN has been pointed out, and 11–69% of ANR were identified as having OCD even after excluding food or body-related obsessive-like symptoms or ritualized eating behaviors [7, 43]. Further studies are required to clarify the prevalence of OCD characteristics of AN, especially in adolescents.

Substance Use Disorder

We found statistically significant differences between AN subgroups in the likelihood of having comorbid substance use disorder with rates ranging from 1.4% (ANR) to 26.7% (ANBP). Univariate regression analysis confirmed that the difference in the likelihood of substance use disorder between AN female subgroups is mainly due to ANBP patients. With the effects of multiple variables teased out through statistical control using adjusted odds ratios, patients with ANBP were 18 times as likely to have at least one substance use disorder. Those results are similar to other findings in adults that support the proposition, that patients who binge and purge use more substances than ANR patients [44]. Substance use disorder, however, is also impacted by age [45]. Since ANR are younger than ANBP, increasing substance use disorder would be expected in ANBP than in ANR.

Epidemiological research has shown that the prevalence of depression, anxiety disorders and substance abuse increase between childhood and adulthood [46] and it appears that this remains true for patients suffering from AN. Therefore, prospective and longitudinal follow-up studies on children and adolescents are needed to make causal connections regarding the relationship between AN and comorbid Axis I psychopathology. Furthermore, the field would benefit from the consistent use of a carefully selected control group, which, at a minimum, should be matched on level of gender and age.

Limitations

The present study has several limitations. First, the identification of the Axis I diagnoses was based on the adolescent reports of psychopathology. Parents were not integrated in the assessment of the diagnostic interviews. Although existing studies suggest that the amount of agreement on diagnostic information between adolescents and their parents decreases with age [47], we acknowledge that inclusion of parent-reported information would have increased the reliability of diagnostic information in

some cases. A second limitation may be a referral bias, because the adolescents were referred to a child and adolescent psychiatric clinic at a university hospital. A lot of adolescents referred to this department display severe psychopathology. Therefore, the findings probably cannot be generalized to other mental health settings. Third, our sample was largely Caucasian, so these results may not generalize to other racial and ethnic groups. Fourthly, this study examined a help-seeking sample. Psychiatric comorbidities may differ between such samples and community samples with the same illness [48]. Other limitations include the rather small sample size, especially in the case of the ANBP patients. However, our results are quite similar to the most recent findings in adults with ANBP.

Clinical Implications

There are potentially important clinical and research implications for the findings of this study. The frequency of current DSM-IV Axis I comorbidities in this sample was 73.3%. This result is consistent with the outcome of other studies in adults, and indicates that psychiatric comorbidities occur at a meaningful rate in adolescents with AN. Therefore, broad diagnostic assessments, which include structured interviews, are essential to identify psychiatric comorbidities in those adolescents. The high comorbidity rate of mood disorders, anxiety disorders and substance use disorders in AN patients suggests that AN adolescents should be routinely screened for those psychiatric disorders, because psychiatric comorbidities represent unfavorable prognostic factors. Longer duration of illness, higher incidence of comorbid substance use disorders and anxiety disorder without OCD in ANBP patients may explain why this subgroup displays a less favorable outcome compared to ANR. Therefore it is not surprising that they have more outpatient treatment experience.

Summary

The present study examined the current DSM-IV Axis I comorbidities in a sample of female adolescents with AN who had been referred to an in- and outpatient psychiatric unit. All patients were systematically evaluated using structured diagnostic interviews. The prevalence of current DSM-IV Axis I comorbidities in this sample was 73.3%. There was no difference in the comorbidity rate in the AN subgroups. The most common psychiatric comorbidities were mood disorders (60.4%), followed by the category anxiety disorders without OCD (25.7%), OCD (16.8%) and substance use disorders (7.9%). Substance use disorders and anxiety disorders without OCD differed across AN subgroups. Substance use disorders were 18 times as likely to occur and the category anxiety disorders without OCD was three times as likely to occur in ANBP in comparison to ANR. Overall, these findings indicate that DSM-IV Axis I comorbidities appear at a significant rate in adolescents suffering from AN. Systematic assessments are required to consider those less favorable outcome factors in AN.

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