





Predictors for and duration of hospitalization among children and adolescents with eating disorders

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Abstract

Objective: The objective of this study was to investigate the predictive value of sex, age, body mass index (BMI), Eating Disorder Examination (EDE) score, social risk factors, and psychiatric comorbidities for hospitalization and hospitalization duration among children and adolescents suffering from eating disorders.

Method: This prospective cohort study involved 522 consecutive patients who had been referred to a specialized eating disorder unit between January 1, 2009 and December 31, 2015; participants were followed up until August 1, 2016 by medical records. We used regression analyses to evaluate the prognostic value of sex, age, BMI, EDE, eating disorder diagnoses, social risk factors, and psychiatric comorbidities concerning inpatient hospitalization and hospitalization duration.

Results: We found that younger age, higher EDE global score, lower BMI percentile, anorexia nervosa, a higher number of social risk factors, and the presence of diagnosed self-harm increased the odds of being hospitalized, while being female and having a comorbid autism spectrum condition increased the duration of hospitalization. No other psychiatric comorbidity was found to significantly predict hospitalization or duration of hospitalization.

Discussion: The odds of being hospitalized were predicted by the severity of anorexia nervosa and indicators of social risk factors in the family, whereas the duration of hospitalization was predicted by having a comorbid autism spectrum condition, indicating a difference between the factors affecting the risk of hospitalization and the factors affecting the duration of hospitalization. This calls for further exploration of tailored treatments for eating disorders.

Public Significance Statement: This study finds that hospitalization for an eating disorder is predicted by the severity of the illness, self-harm, and social risk factors. Duration of hospitalization is predicted by having a comorbid autism spectrum condition. These findings indicate that the treatment of eating disorders may require different treatment approaches depending on the presentation of the individual patient to reduce both the need for hospitalization and the length of inpatient stay.

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KEYWORDS

adolescent, anorexia nervosa, child, eating disorders, hospitalization

1 | INTRODUCTION

Patients suffering from eating disorders (EDs) are at risk of developing a chronic course of the disease, severe somatic complications, and premature death (Arcelus et al., 2011; Fichter & Quadflieg, 2016; Papadopoulous et al., 2009; Steinhausen, 2009; Suokas et al., 2013; Wentz et al., 2009; Zerwas et al., 2015). Approximately 10%–20% of patients with anorexia nervosa (AN) and 10% of patients with bulimia nervosa (BN) are reported to have a longstanding course of the disease (Andrés-Pepiñá et al., 2020; Keel & Brown, 2010; Steinhausen, 2002; Sullivan et al., 1998; Wentz et al., 2009). Therefore, to improve the treatment results and prevent long-term EDs, it is important to investigate predictive and maintaining factors that might influence and complicate treatment and disease course (Hay & Touyz, 2015; Linardon et al., 2016; Treasure & Russell, 2011).

In AN, rapid response to treatment predicts a better outcome (Linardon et al., 2016; Vall & Wade, 2015), and early intervention is presumed to be the most effective method for preventing a long-standing course (Linardon et al., 2016; Vall & Wade, 2015). Thus, a short duration of ED before treatment is associated with a better prognosis (Steinhausen, 2002; Vall & Wade, 2015), whereas a longer duration of ED before treatment is linked to a worse outcome (Treasure & Russell, 2011). However, rapid response to treatment does not necessarily have the same impact on the course of all EDs. One study conducted on patients with AN and BN found that early recovery was associated with long-term recovery only among the patients with AN (Eddy et al., 2017), while another study found that although the probability of initial recovery was greater for patients with AN compared to BN, the probability of recovery after 10 years was greater for the patients with BN compared to those with AN (Von Holle et al., 2008). Long duration of EDs may also be caused by maintaining factors other than the severity of the disorder itself, such as perfectionism or psychiatric comorbidity hindering recovery (Keel & Brown, 2010; Stice, 2002; Vall & Wade, 2015). In this study, we want to identify predictors of both severe ED and lack of rapid response to treatment, by identifying factors for hospitalization and duration of hospitalization.

Psychiatric comorbidities are common among patients suffering from an ED (Herpertz-Dahlmann et al., 2001; Rojo-Moreno et al., 2015; Steinhausen, 2009), but the evidence regarding the predictive value of comorbidities for the course of EDs is conflicting. For instance one study did not find psychiatric comorbidity to have predictive value for persistent ED among patients with AN (Fichter et al., 2017), whereas another study found mood and personality disorders to predict a worse outcome for patients with AN, although anxiety disorders were found to have no predictive value (Saccomani et al., 1998). Moreover, a review from 2015 found that lower levels of comorbid psychopathology were associated with a better outcome at the end of the treatment among patients with EDs (Vall &

Wade, 2015), while a review from 2010 revealed that comorbidity had predictive value for BN and prognostics factors for AN were linked to the duration and severity of the disorder (Keel & Brown, 2010).

This shows that earlier studies reported heterogeneous and often contradictory predictors of the course of EDs (Steinhausen, 2009). This may be due to heterogenic definitions of remission as well as varying study samples, types of treatment (Couturier & Lock, 2006; Jagielska & Kacperska, 2017; Radunz et al., 2020), and predictors, which may influence either the maintenance or severity of the disorder or the treatment (Kotilahti et al., 2020; Linardon et al., 2017). Therefore, the investigation of the clinical treatment course, for instance, in terms of the intensity of treatment required, is of interest as an alternative to investigating only the eating pathology outcome.

It has been suggested that treatment outcomes should be investigated in relation to both the severity and the duration of the EDs, and individually tailored treatments are needed for patients with EDs (Kotilahti et al., 2020; Linardon et al., 2016; Radunz et al., 2020). Early identification of patients who are at risk of long-term hospitalization for ED could be an important first step in identifying patients at risk of developing a severe and longstanding course of an ED and in need of a more personalized intervention. Thus far, no study has provided data on whether it is possible, early in the course of treatment to identify which young patients will develop long-term ED. Moreover, it is unknown whether early intervention can prevent the development of a longstanding course of ED (Kaplan & Strober, 2019). Therefore, we hope to provide the first step in this progress, by exploring predictors of the duration of severe ED using hospitalization and the duration of hospitalization as proxies. In this study, the decision to hospitalize the patient was made by the clinicians and was carried out either voluntarily or involuntarily, as it correlated with the clinical state of the patient. We investigated whether social factors, type of eating disorder diagnosis, the severity of the eating disorder, weight status, and psychiatric comorbidity at referral are associated with the need for hospitalization and the duration of inpatient treatment in adolescents suffering from an eating disorder. We hypothesized that psychiatric comorbidity, weight status, the severity of the eating disorder, and social risk factors increase both the risk of hospitalization and the duration of hospitalization. Furthermore, we also hypothesized that different psychiatric comorbidities affect the risk of hospitalization and the duration of hospitalization differently.

2 | METHOD

2.1 | Design

A naturalistic follow-up cohort study conducted in a clinical setting in the specialized Eating Disorder Unit at Child and Adolescents Mental

Health Center (CAMHS), Bispebjerg in the Capital Region of Denmark.

2.2 | Sample

The cohort consisted of all consecutive children and adolescents referred to and treated for ED at the specialized Eating Disorder Unit at Bispebjerg CAMHS, Capital Region of Denmark, between January 1, 2009 and December 31, 2015, which included all the patients in the geographically defined catchment area of Bispebjerg, along with severe cases from other catchment areas in the Capital Region and Region Zealand. By January 1, 2014, the geographical catchment area of Bispebjerg was enlarged by covering the entire Capital Region. For most patients, the first line of treatment was an outpatient family-based intervention with weekly sessions, which was broadly inspired by the principles of Lock's family-based treatment of EDs (Lock & Le Grange, 2015), and which could be supplemented with individual therapy or multifamily therapy modalities as per the clinician's decision.

A minority of patients were hospitalized at presentation due to the severity of symptoms.

The inclusion criteria were referral to CAMHS and a diagnosis of either AN (F50.0), atypical AN (AAN; F50.1), BN (F50.2), atypical BN (ABN; F50.3), other eating disorder (F50.8), or unspecified eating disorder (F50.9), according to the 10th revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) (World Health Organization, 1992).

2.3 | Measures

The diagnoses and severity of the ED were assessed using the Eating Disorder Examination (EDE) global score (Cooper et al., 1989), which was administered by psychologists who were trained in EDE, and the patient's weight status was measured using age- and sex-specific percentiles from the National Center for Health Statistics (United States) for body mass index (BMI = weight [kg]/height [m²]) (Centers for Disease Control and Prevention, 2000). Both of these values, along with age, were recorded within 10 days of the first contact with the patient. The data were entered into a separate quality assurance database simultaneously with the data being entered in the clinical charts.

All ED and comorbid psychiatric diagnoses were made by specialists in child and adolescent psychiatry and assigned at multidisciplinary conferences in the presence of psychologists, nurses, and child and adolescent psychiatrists based on a combination of clinical interviews and clinical observations as well as in accordance with the diagnostic criteria of ICD-10. For this study, the specific ED diagnosis and the comorbid psychiatric diagnoses were collected by the first author from the patient's medical records beginning from the period of the first contact to the first change in hospitalization status. In this context, hospital status was defined as either hospitalization, which referred to inpatient treatment, or nonhospitalization, which included (a) day-patient treatment, where the patients participate in the

treatment at the clinic every day but sleep at home and (b) outpatient treatment. The data on hospitalization were collected from January 1, 2009 to August 1, 2016, which included a minimum follow-up period of 7 months. If an individual was hospitalized more than once within that period, the durations (measured in days of hospitalization) of all instances of hospitalization were summarized. We grouped psychiatric comorbidities according to the F-chapter of ICD-10, that is, psychotic disorders (F20–F29), affective disorders (F30–F39), anxiety disorders (F40–49), disorders of personality (F60–F69), mental retardation and inferioritas intellectualis (F70–F79, R41.8), autism spectrum conditions (ASC) (F80–F89), and other emotional and behavioral disorders (F90–F99). Furthermore, we included information regarding any diagnosis of self-harm (X60–X84) and social risk factors indicated by the number of Z-diagnoses made (Z00–Z99).

2.4 | Statistics

The outcomes were “being hospitalized” (categorical: yes/no) and “total duration of hospitalization” (continuous: in days). We performed ANOVA and Pearson's chi-squared analyses with Bonferroni corrections to investigate the differences in hospitalization and the duration of hospitalization. Furthermore, we performed regression analyses to examine the predictors of hospitalization and the duration of hospitalization.

The predictor variables entered in the regression analyses were age, year of the first contact, sex, each group of psychiatric comorbidity, EDE global score, diagnosis of self-harm, and the number of social risk factors. We included the year of first contact to control for differences in follow-up time between patients.

We began by performing a logistic regression analysis with manual stepwise elimination of variables using a significance level of $p \leq 0.05$ to estimate the predictors' influence on the risk of hospitalization, which helped us to determine the estimate the odds ratio (OR) of being hospitalized. The variables eliminated early were reintroduced to check for confounding. Then, in order to estimate the variables' influence on the duration of hospitalization, we performed a negative binomial regression analysis in the same manner as the logistic regression analysis with the hospitalized individuals only. We chose a negative binomial regression analysis because of the distribution of the data. Sex, age, and year of referral were a priori kept in the analyses to control for differences in the follow-up time, while the female sex and AN were used as references.

Age, year of the first contact, EDE global score, and the number of social risk factors were entered as continuous variables; ED and BMI percentiles were entered as categorical variables; and sex, diagnosis of self-harm, and comorbidity of ASC were entered as dichotomous variables.

The EDE global scores were calculated according to the EDE rating scheme (Cooper et al., 1989). The EDE is a validated, standardized interview, and the EDE global score is the mean score of four EDE subscales: dietary restraint, eating concern, weight concern, and shape concern. Moreover, the BMI values were converted to Z-scores,

TABLE 1 Characteristics of patients at referral.

Diagnostic groups	Sex		Mean age (SD)	BMI (SD)	BMI Z-score (SD)	Mean EDE global score (SD)	Mean number of psychiatric comorbidities (SD)	Mean number of social risk diagnoses (SD)
	Male	Female						
AN	25	279	14.7 (1.8)	15.6 (1.6)	-2.14 (1.14)	2.94 (1.36)	0.57 (0.83)	0.26 (0.66)
AAN	12	86	15.1 (1.7)	16.8 (2.2)	-1.56 (1.23)	2.36 (1.70)	0.79 (0.97)	0.26 (0.66)
BN	1	44	16.0 (1.3)	20.9 (2.5)	0.02 (0.76)	4.00 (1.27)	0.71 (0.82)	0.40 (0.75)
ABN	1	14	15.5 (1.0)	19.3 (2.2)	-0.45 (0.98)	4.10 (1.48)	0.80 (1.08)	0.27 (0.59)
Other ED	12	35	14.3 (2.2)	17.3 (4.2)	-1.41 (1.62)	2.41 (1.61)	1.06 (1.07)	0.38 (0.95)
Unspecified ED	1	12	15.8 (1.6)	19.1 (2.4)	-0.57 (0.99)	3.16 (1.37)	0.46 (0.88)	0.38 (0.87)
Total	52	470	14.9 (1.8)	16.6 (2.7)	-1.70 (1.35)	2.94 (1.50)	0.67 (0.90)	0.28 (0.70)

Note: Psychiatric comorbidities, a psychiatric diagnosis between F00 and F99, except the diagnoses between F50 and F59 in ICD-10; Social Diagnoses, Z00–Z99 diagnoses from the ICD-10; Z-score, number of SD the datapoint is above or below the mean.

Abbreviations: AAN, atypical anorexia nervosa (ICD-10: F50.1); ABN, atypical bulimia nervosa (ICD-10: F50.3); AN, anorexia nervosa (ICD-10: F50.0); BMI, body mass index; BN, bulimia nervosa (ICD-10: F50.2); EDE, eating disorder examination; Other ED, other eating disorder (ICD-10: F50.8); Unspecified ED, unspecified eating disorder (ICD-10: F50.9).

matching the sex and age group of the individual patient (Centers for Disease Control and Prevention, 2000), and grouped in percentiles as follows: <1%, 1%–2.5%, 2.5%–5%, 5%–10%, 10%–25%, 25%–50%, 50%–75%, 75%–90%, 90%–95%, and >95%. This was done because BMI norms differ according to sex and age for children under the age of 18.

We used SPSS Statistics 22 for Windows. The data were collected in a quality assurance database and approved by the Danish Patient Safety Authority (jr. nr. 3-3013-1549/1/) as well as the Danish Data Protection Agency (RHP-2015-025, I-Suite nr: 04093).

3 | RESULTS

A total of 546 individuals were referred to the specialized CAMHS ED unit between January 1, 2009 and December 31, 2015. Out of these, we excluded 18 for not receiving an ED diagnosis and 6 due to missing data, which left us with 522 participants in the cohort (470 of whom were female).

The distribution of ED diagnoses among the participants was as follows AN = 304 (58%, 279 females), BN = 45 (9%, 44 females), AAN = 98 (19%, 86 females), ABN = 15 (3%, 14 females), other ED = 47 (9%, 35 females), and unspecified ED = 13 (2%, 12 females). Out of the 522 total participants, 155 (29.7%) were hospitalized during the follow-up period.

At the time of referral, the AAN and AN groups had the lowest BMI, whereas the ABN and BN groups had the highest EDE global scores (Table 1).

Table 2 presents the results of our Pearson's chi-squared test and ANOVA analyses, which indicate that more patients with AN were hospitalized compared to those with AAN and that more patients diagnosed with self-harm or demonstrating any social diagnosis were hospitalized compared to patients without these diagnoses. Furthermore, patients with ASC required a longer duration of hospitalization. In this cohort, social risk factors were mostly within the range of

Z60.0–Z70.0, with Z63.5 ($n = 18$; disruption of the family by separation and divorce), and Z63.7 ($n = 13$; other stressful life events affecting family and household) being the most prevalent, whereas the only other Z-diagnosis with a prevalence of more than 4 was Z81.8 ($n = 15$; family history of other mental and behavioral disorders).

The logistic regression analyses revealed that the odds of hospitalization were significantly higher for patients diagnosed with typical AN compared to those who were diagnosed with AAN (OR 0.05, 95% CI = 0.0–0.71), demonstrating social risk factors, or were diagnosed with self-harm (Table 3). Furthermore, younger age, lower BMI percentile, and higher EDE scores were also found to increase the odds of hospitalization (Table 3).

As Table 2 shows, a longer duration of hospitalization was associated with an ASC diagnosis the negative binomial regression also found that longer duration of hospitalization was associated with ASC, AN compared to BN, female sex, and an earlier calendar year of referral (Table 3).

We observed a negative association between AAN diagnosis and hospitalization when compared to AN, and a positive association between the presence of social risk factors and/or self-harm and hospitalization (Table 2). Moreover, the regression analyses indicated that younger age at presentation, type of ED diagnosis, social risk factors, self-harm, a higher EDE global score, and a lower BMI percentile at presentation predicted the odds of hospitalization, whereas female sex, ASC, and earlier year of referral predicted a longer duration of hospitalization (Table 3).

4 | DISCUSSION

This study investigated early prognostic factors for hospitalization and the duration of hospitalization among children and adolescents with ED who were referred to a specialized ED clinic.

Younger age, lower weight status, higher EDE score, more social risk factors, presence of self-harm, and typical AN (compared to AAN)

TABLE 2 Distributions of comorbidities at referral and hospitalization and duration of hospitalization.

Variable	Groups	Total	Number of patients hospitalized (%)	Mean duration of hospitalization in days (SD)
Sex	Male	52	17 (32.7)	87.8 (105.9)
	Female	470	148 (26.4)	164.5 (205.0)
Eating disorder diagnosis	AN	304	102 (33.6)*	175.5 (221.1)
	AAN	98	19 (19.4)	142.9 (124.0)
	BN	45	6 (13.3)	39.8 (42.3)
	ABN	15	4 (26.7)	111.0 (163.8)
	Other ED	47	18 (38.3)	125.4 (177.3)
	Unspecified ED	13	6 (46.2)	105.3 (72.6)
Schizophrenia (F29–F29)	Yes	9	4 (44.4)	176.0 (189.3)
	No	513	151 (29.4)	155.5 (198.6)
Affective disorders (F30–F39)	Yes	104	38 (36.5)	155.8 (175.0)
	No	418	117 (28.0)	156.2 (205.4)
Anxiety disorders (F40–F49)	Yes	81	31 (38.1)	167.4 (191.1)
	No	441	124 (28.1)	153.2 (200.1)
Disorders of personality (F60–F69)	Yes	9	5 (55.6)	168.2 (125.8)
	No	513	150 (29.2)	155.7 (200.1)
Mental retardation (F70–F79 + R41.8)	Yes	11	5 (45.5)	278.0 (225.6)
	No	511	150 (29.4)	152.2 (196.4)
Autism spectrum condition (F80–F89)	Yes	70	24 (34.3)	279.9 (269.3)*
	No	452	131 (29.0)	133.4 (173.8)
Emotional and behavioral disorders (F90–F99)	Yes	44	15 (34.1)	231.2 (267.4)
	No	478	140 (29.3)	148.0 (188.4)
Any social diagnosis (Z00–Z99)	Yes	94	44 (46.8)*	164.8 (171.7)
	No	428	111 (25.9)	152.6 (207.9)
Diagnosis of self-harm (X60–X84)	Yes	13	10 (76.9)*	192.6 (194.8)
	No	509	145 (28.5)	152.6 (198.5)

Note: () refers to diagnostic chapters diagnoses from the ICD-10.

Abbreviations: AAN, atypical anorexia nervosa (ICD-10: F50.1); ABN, atypical bulimia nervosa (ICD-10: F50.3); AN, anorexia nervosa (ICD-10: F50.0); BMI, body mass index; BN, bulimia nervosa (ICD-10: F50.2); EDE, eating disorder examination; Other ED, other eating disorder (ICD-10: F50.8); Unspecified ED, unspecified eating disorder (ICD-10: F50.9).

*A statistically significant difference in hospitalization or duration of hospitalization between groups depending on the variable; $p \leq .05$.

at presentation were associated with increased odds of hospitalization, while female sex and ASC predicted a longer duration of hospitalization.

The odds of hospitalization were predicted by a higher EDE score and a lower BMI at presentation, which supports the findings of the previous studies that identified low BMI as a predictor of poor outcome (Fichter et al., 2017; Kaplan et al., 2009). Interestingly, neither the BMI nor the EDE score predicted the duration of hospitalization, indicating that the severity of the ED at the first contact does not predict the duration of hospitalization. Hospitalization was also predicted by self-harm and social risk factors, which is consistent with the results of previous studies (Löwe et al., 2001; Nozoe et al., 1995; Saccomani et al., 1998). The presence of social risk factors may reflect that the total number of stressors on the individual family may reduce necessary resources in the family and stand in the way of taking on

the additional tasks involved in engaging in outpatient family-based treatment. Multiple stressors upon the family besides the ED of the patient have previously been found to influence remission and to be associated with family behaviors, and the ability to change behaviors in the family (Lock et al., 2006). Our findings add to this by indicating that multiple stressors on a family increase risk of hospitalization. These findings suggest that increased social support for families with a child suffering from an ED to enable them to engage in family-based treatment could result in fewer hospitalizations. In parallel, self-harm behaviors in a young person with ED add yet another stressor to parents and families, and it may interfere with undertaking the renourishment in the home with outpatient support, thus indicating the need for more intensive treatment modalities.

In the present study, the duration of hospitalization was predicted by comorbid ASC, whereas the odds of hospitalization were not

TABLE 3 Factors influencing odds of hospitalization and duration of hospitalization.

Variables	Odds of hospitalization		The factor by which the duration of hospitalization is affected	
	OR	95% CI	Ratio of duration of hospitalization (b)	95% CI
Female	Ref	Ref	Ref	Ref
Male	0.99	0.43–2.28	0.34*	0.18–0.68
Age	0.82*	0.71–0.94	0.91	0.80–1.03
Year of referral	0.72	0.63–0.82	0.87*	0.78–0.96
AN	Ref	Ref	Ref	Ref
AAN	0.05*	0.0–0.71	0.80	0.48–1.34
BN	0.11	0.01–1.49	0.33*	0.14–0.79
ABN	0.11	0.01–1.52	1.13	0.35–3.64
Other ED	0.06	0.00–1.18	0.90	0.50–1.61
Unspecified ED	0.35	0.02–5.23	1.22	0.43–3.45
EDE Score	1.37*	1.14–1.65	-	-
Number of social diagnoses (Z00–Z99)	1.56*	1.14–2.12	-	-
BMI Percentiles	0.85*	0.75–0.98	-	-
Self-harm diagnosis (X60–X84)	8.30*	1.82–37.87	-	-
Autism spectrum condition (F80–F89)	-	-	1.90*	1.17–3.09

Note: () refers to diagnostic chapters diagnoses from the ICD-10. A value above 1 in OR or Ratio of duration hospitalization indicates an increase in odds of hospitalization or duration of hospitalization with an increase in the variable, and vice versa. Age, EDE score and number of social diagnoses are continuous variables with the ratios indicating change with a one unit increase of the variable; Year of referral, ED and BMI percentiles are grouped variables; sex, self-harm diagnosis, and autism spectrum disorder are dichotomic variables. Missing values indicate that the variable was eliminated in the stepwise elimination due to no significance in the multivariate analysis.

Abbreviations: AAN, atypical anorexia nervosa; ABN, atypical bulimia nervosa; AN, anorexia nervosa; BN, bulimia nervosa; BMI, body mass index; CI, confidence interval; EDE, eating disorder examination; OR, odds ratio; Other ED, other eating disorder; Unspecified ED, unspecified eating disorder.

*Indicates a statistical significant difference between groups with $p \leq .05$.

predicted by ASC, which partly contradicts the findings of a study conducted in the same hospital but using a later sample, where comorbid ASC increased the chance of receiving intensified treatment in the form of day hospital or full hospitalization (Bentz et al., 2022). Similar findings were reported in another study (Nazar et al., 2018). However, across various studies, including the present one, ASC appeared to play a significant role in the treatment response and outcomes of EDs. For example, Nielsen et al. (Nielsen et al., 2022) found that autistic traits predict worse outcomes at up to 30 years of follow-up, and Tchanturia et al. found that ASC negatively influenced the response to group cognitive remediation therapy among patients with AN, with the patients with higher levels of autistic traits showing no improvement in cognition style or motivation after treatment (Tchanturia et al., 2016). This may reflect the fact that some ASC traits could serve as maintaining factors for the ED and/or that the treatment provided was not specifically targeted toward patients with ASC. Thus, our findings add to the arguments for adapting the hospital environment to individuals with comorbid AN and ASC to increase treatment effectiveness, as suggested by, for example, Tchanturia et al. in the *Pathway for Eating Disorders and Autism Developed from Clinical Experience* (the PEACE pathway) (Tchanturia et al., 2016). These suggestions include a more literal and less open-ended therapeutic style and adaptations to increase the predictability and

accommodate sensory sensitivity in, for example, waiting areas and dining halls, along with considerations for social and/or sensory overload.

In the present study, BMI and EDE scores at presentation did not predict the duration of hospitalization, which contrasts with the findings of previous studies (Kästner et al., 2018; Maguire et al., 2003). For instance, Maguire et al. (Maguire et al., 2003) found that only previous admissions and a low BMI score at admission predicted the duration of hospitalization. These conflicting findings may be explained by the differences in follow-up time, as the study by Maguire et al. had a follow-up time of 20 months, with recruitment throughout the follow-up period, as compared to the 7.5 years of follow-up time in our study. As BMI is an acute measure of the severity of ED, a shorter follow-up time may be more prone to showing an association with the duration of hospitalization, but when the follow-up time increases, the significance of this severity measure ceases unless it also predicts the duration of hospitalization in addition to the acute phase. However, with longer follow-up periods, the predictors of the duration of hospitalization emerge in addition to the acute phase. The same was the case with the study by Kästner et al. (Kästner et al., 2018) which had a follow-up time of 27 months. Notably, both these studies only included patients who had given their consent, which resulted in selection bias.

In our study, no psychiatric comorbidities other than ASC were predictive of hospitalization or a long hospitalization duration, which is consistent with the findings of a large longitudinal study (Fichter et al., 2017). This is in contrast to several reviews finding different psychiatric comorbidities negatively influenced the prognosis of ED (Keel & Brown, 2010; Vall & Wade, 2015). Further studies conducted on children and adolescents also found that comorbidity negatively influenced the prognosis of ED (Hjern et al., 2006; Saccomani et al., 1998). Notably, both of these studies on children and adolescents only involved patients with AN. In one (Hjern et al., 2006) death and rehospitalization were used as poor outcomes, whereas in the study by Saccomani et al. (Saccomani et al., 1998), ED pathology was used as the outcome, which may explain the contrasting finding of our study, as we used hospitalization and hospitalization duration as outcomes, and a patient may be hospitalized due to factors other than ED pathology.

The results of our study also contrast with those of previous studies that found that anxiety, personality disorders, and mood disorders prolong the duration of hospitalization (Liewers et al., 2009; Nozoe et al., 1995). Both studies involved young patients who were up to 22 years of age but only measured the duration of one instance of hospitalization. This conflicting evidence is likely due to the methodological differences between the studies.

4.1 | Strengths and limitations

The real-life setting of this study served as one of its strengths because it allowed us to include all the patients diagnosed at the specialized ED unit by using systemically collected data from the medical records concerning exposure and outcome variables, allowing for the inclusion of a sample representative of a geographical area, a high number of patients, and minimized missing data. Since admissions to and treatment in public hospitals in Denmark are paid through taxes, the social selection of participants by wealth is minimal. Furthermore, using hospitalization and hospitalization duration as outcomes highlights the clinical relevance of our results, as they reflect the severity and impact of the disease on the patients, along with the long-term outcome of ED. This is because the duration of hospitalization has been found to predict the outcome of ED even 9–14 years after hospitalization (Hjern et al., 2006). In line with the recommendations from the literature, we examined the predictors across the full spectrum of ED subtypes (Vall & Wade, 2015).

However, our methods also had some limitations. We did not register how many patients were hospitalized at presentation, this did only happen to few patients, but it is a limitation, that we cannot specify this number. We included the calendar year of referral and age to control for the differences in the follow-up time between the patients, but the data were not available to determine whether the patients had moved from the catchment area or died; consequently, some were lost to follow-up. Moreover, the catchment area of the unit was enlarged during the study period, which might have potentially changed the demographics. Finally, our results only support prognostic factors for children and adolescents and, therefore, cannot

necessarily be extrapolated to adults. This study did not account for migration between EDs.

Another limitation of our study is that we added the duration of hospitalizations if the patient had more than one hospitalization. Using the number of hospitalizations and/or length of singular hospitalizations may reveal clinically relevant patterns among certain groups of patients, for example, the risk of rehospitalization.

We chose to collapse day hospital treatment with outpatient treatment, this can be viewed as either a strength or a weakness, we have done this, as we wanted to describe predictors for the need of the highest intensity of treatment.

Finally, we did not look into or register ethnicity/race this is due to the study being based on data registered in a clinical setting, this is a limitation as well.

In conclusion, our findings indicate that factors predicting hospitalization are linked to both disease severity and social risk factors and that comorbidity with ASC can prolong the duration of hospitalization. These findings have several clinical implications. First, caring for an ill child with ED is a significant burden for all families, and the fact that social risk factors increase the risk of hospitalization suggests that if more support is available for multi-stressed families in outpatient treatment, fewer children and adolescents might need hospitalization for their ED. Second, as ASC may interfere with ED treatment, this underlines the need to tailor treatments in general and hospital environments specifically according to the needs of those with ED and ASC. Therefore, future research should aim to investigate the influence of specific predictors on EDs according to different time points in the treatment to differentiate between the predictors of severity and the predictors of long-term disorders.

AUTHOR CONTRIBUTIONS

Mette Bentz: Conceptualization; investigation; methodology; supervision; writing – review and editing. **Else Marie Marie Olsen:** Conceptualization; investigation; methodology; supervision; writing – review and editing. **Ulla Moslet:** Conceptualization; investigation; methodology; writing – review and editing. **Kerstin Jessica Plessen:** Conceptualization; funding acquisition; methodology; project administration; supervision; writing – review and editing. **Susanne Vinkel Koch:** Conceptualization; funding acquisition; methodology; project administration; supervision; writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

It is not possible to share data publicly, as access to data requires permission from the Danish Data Protection Agency and the Danish Patient Safety Authority.

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