

Childhood trauma and outcome trajectories in patients with longstanding eating disorders across 17 years

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Abstract

Background: A large proportion of patients with eating disorders (ED) report experiences of childhood trauma. Latent trajectory analysis in ED samples reveals the complexities in course and outcome and can explore the long-term impact of adverse experiences in childhood.

Method: A total of 84 patients with longstanding ED were included. ED symptoms were assessed by the Eating Disorder Examination interview at discharge from inpatient treatment, and at 1-, 2-, 5-, and 17-year follow-up, respectively. Change over time was examined using growth mixture modeling, allowing the number of trajectories to emerge through the data. Prevalence of childhood trauma was assessed, and its relation to class membership was tested.

Results: We identified four distinct classes: patients with (a) a continuous improvement in the entire follow-up period, and scores within normal range at the end, “continuous improvement” (54.8%); (b) a high symptom level at baseline and moderate decrease over time, “high and declining” (22.6%); (c) initial ED scores below clinical cut-off and stable symptoms throughout the course, “consistently low” (14.3%); and (d) with high scores initially, and a significant increase in symptoms over time, “high and increasing” (8.3%). A history of childhood sexual abuse (CSA) was overrepresented in classes with persistently high symptom levels and poor long-term outcome.

Discussion: Patients with longstanding ED displayed considerable diversity in trajectories of symptom change across 17 years. To improve long-term outcome, enhanced treatment of sequelae from CSA seems essential.

Public Significance: Patients with longstanding eating disorders displayed four different trajectories of change in a 17-year follow-up study. Although there were significant changes over time, the majority of patients remained within similar symptom levels as they presented with at discharge from inpatient treatment. Exposure to childhood maltreatment was common within the sample. Childhood sexual abuse predicted poor long-term outcome, which highlights the importance of trauma informed care.

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KEYWORDS

childhood maltreatment, childhood physical abuse, childhood sexual abuse, eating disorders, growth mixture modeling, latent class analysis, long-term outcome, neglect

1 | INTRODUCTION

Childhood maltreatment (CM) is defined as “any act of commission or omission by a caregiver that result in harm, potential for harm, or threat of harm to a child, regardless of the caregivers' intent” and may be further categorized as physical, emotional, and sexual abuse, in addition to various forms of neglect (Gilbert et al., 2009). The prevalence of CM is higher among patients with eating disorders (EDs) compared to both patients with other psychiatric disorders and healthy controls (Afifi et al., 2017; Molendijk et al., 2017; Rienecke et al., 2022; Smolak & Murnen, 2002). In a systematic review of CM in patients with ED (Molendijk et al., 2017), the prevalence was 45% for emotional abuse and neglect, 31% for sexual abuse, and 26% for physical abuse. When ED occurs alongside a history of CM, both comorbidity and suicidality tend to be higher (Arata et al., 2005; Forrest et al., 2021; Molendijk et al., 2017), dropout from treatment increases (Castellini et al., 2018), and the rates of full recovery decline (Mahon et al., 2001).

Childhood sexual abuse (CSA) has been studied extensively (Caslini et al., 2016; Chen et al., 2010; Smolak & Murnen, 2002), and several pathways from CSA to ED have been suggested. One pathway relates to how the sexual trauma affects body perception, such as shame, contempt, negative body image, and attempts to protect from future sexual trauma, while another considers ED as a coping mechanism to regain control, regulate emotions, and handle psychological difficulties in the aftermath of trauma (Madowitz et al., 2015; Moulton et al., 2015; Reyes-Rodríguez et al., 2011). A recent population study found that various forms of CM affected men and women differently, whereas CSA was strongly associated with ED regardless of gender (Afifi et al., 2017). However, it is increasingly recognized that non-sexual CM, such as physical- and emotional abuse and neglect, also elevate the risk of any ED (Afifi et al., 2017; Hazzard et al., 2019; Kimber et al., 2017; Molendijk et al., 2017; Ziobrowski et al., 2021). Furthermore, many children experience multiple forms of CM, with estimates varying from 36% to 91%, dependent on classification (Finkelhor et al., 2007; Gilbert et al., 2009; Lau et al., 2005; Rienecke et al., 2022). Previous studies have often focused on only one form of maltreatment, such as CSA (Chen et al., 2010; Smolak & Murnen, 2002), possibly losing sight of potential cumulative effects of CM (Ziobrowski et al., 2021). Similarly, including only one ED subtype (Becker & Grilo, 2011; Striegel-Moore et al., 2002) could dissimulate the complexity in the relationship between ED and CM. Several meta-analyses point to severity parameters, where ED and CM are associated in a dose dependent manner: increased exposure was accompanied by more severe symptoms (Mahon et al., 2001; Molendijk et al., 2017). The same pattern was evident in community samples; ED symptoms were more prevalent among individuals reporting multi-type CM as

opposed to classes with no/low trauma or one specific form of abuse such as physical or sexual abuse (Hazzard et al., 2019). While CSA seem crucial in the investigation of long-term outcome for patients with ED, the role of additive non-sexual trauma should not be disregarded.

Studies of the long-term outcome of ED found initial diagnoses to explain some of the variance in course and outcome (Eddy et al., 2017; Herzog et al., 1999). However, latent group membership often outperforms traditional diagnostic classification in outcome prediction (Crow et al., 2012; Peterson et al., 2013). Rather than being guided by diagnoses, modeling multiple trajectories of change within a transdiagnostic sample provides a comprehensive way of understanding the heterogeneity among patients with ED. Growth mixture modeling (GMM) enables classification of patients to groups with similar latent patterns of change over time, as well as an examination of possible predictors of group membership (Muthén, 2004). Latent class analysis such as GMM is increasingly being used to examine change during psychotherapy for ED and its relation to long-term outcome. The number of distinct subgroups with differing trajectories of change vary from two (Presseller et al., 2022), three (de Vos et al., 2023; Espel-Huynh et al., 2020; Hilbert et al., 2019; Makhzoumi et al., 2017), four (Austin et al., 2021; Melchior et al., 2016), to five classes (Castellini et al., 2013; Lebow et al., 2019; Montourcy et al., 2018). The studies followed patients during treatment, focusing on how distinct symptom profiles (Castellini et al., 2013; Montourcy et al., 2018) or different response patterns were related to outcome, finding that rapid response (Espel-Huynh et al., 2020; Hilbert et al., 2019; Melchior et al., 2016) and early weight gain (Austin et al., 2021; Makhzoumi et al., 2017) were positive prognostic factors. More severe ED symptomatology along with comorbidity at baseline predicted poor outcome (Castellini et al., 2013; de Vos et al., 2023; Hilbert et al., 2019; Montourcy et al., 2018; Presseller et al., 2022). However, long-term outcome was limited to a timeframe of 3–18 months post-treatment, except for a 6-year follow-up (Castellini et al., 2013) that used latent transition analyses and found moderate stability of profiles in a transdiagnostic sample of ED patients. Some studies only assessed limited parts of the ED psychopathology (Austin et al., 2021; Lebow et al., 2019; Makhzoumi et al., 2017), while others only included a single ED diagnosis (Hilbert et al., 2019; Makhzoumi et al., 2017) or assembled ED with other psychiatric disorders (Melchior et al., 2016; Montourcy et al., 2018). Moreover, these studies did not follow a naturalistic course over a longer time span or examine CM as a predictor of ED outcome.

As part of a prospective longitudinal study (Rø et al., 2003; Rø et al., 2004), the present article aimed to examine how the trajectories of change progressed across decades by incorporating a 17-year follow-up. The study was explorative and extended the previous work by including the full sample and shifting the focus to the naturalistic

course by applying scores at discharge as the baseline measures. A cluster analysis at the 5-year follow-up revealed heterogeneity in treatment response (Vrabel et al., 2008), yet lacked sophistication to investigate latent patterns emerging from the data or disclose variables that might influence group membership. Previous assessments found that co-occurrence of CSA and avoidant personality disorders predicted poor outcome (Vrabel et al., 2010), however no structured evaluation of different forms of CM was conducted, hence were not controlled for. To improve understanding of prevalence and potential long-term impact not only of CSA, but also of additive, non-sexual trauma, a validated questionnaire for CM was introduced. Hopefully the study can contribute with more reliable long-term prognosis and identify relevant factors to improve treatment of patients with longstanding ED.

Our study aims were to (a) examine the prevalence of childhood trauma (sexual abuse, physical abuse, emotional abuse, physical neglect, and emotional neglect) in a transdiagnostic ED sample, (b) identify change trajectories for patients with longstanding ED, and (c) investigate whether the three covariates (CSA as measured by questionnaire, or by medical records, and additive non-sexual childhood trauma) predict class membership.

Based upon previous findings, we hypothesized that the presence of CSA, regardless of assessment method, and additive non-sexual trauma would increase the likelihood of belonging to classes with the poorest long-term prognoses.

2 | METHOD

2.1 | Sample

Eligible for the study were all patients ≥ 18 years of age with anorexia nervosa (AN), bulimia nervosa (BN), or other specified feeding and eating disorders (OSFED) who were consecutively admitted to a specialized ED unit at Modum Bad Psychiatric Hospital in Norway from August 1998 to June 2001. All had received previous treatment without sufficient effect. Patients with severe somatic complications in addition to a body mass index (BMI) < 14 were referred elsewhere for somatic stabilization. The inpatient program was based on cognitive-behavioral therapy conducted in groups and individual sessions, with a duration of 15 (BN/OSFED) to 23 weeks (AN/OSFED). Details of the treatment model are provided elsewhere (Rø et al., 2003; Rø et al., 2004), along with outcomes at 2 (Rø et al., 2005), 5 (Vrabel et al., 2008), and 17 years (Eielsen et al., 2021). In total, 86 patients (85 females), all White, participated in the longitudinal study. Two patients only contributed data at admission and were excluded, as this measuring point was excepted from the analyses. Only 62 patients were available for the 17-year assessment, when the Childhood Trauma Questionnaire (CTQ) was administered. Consequently, the CTQ prevalence findings refer to this subsample ($n = 62$); the remaining analyses included all patients who provided data at any of the five assessments after admission ($N = 84$).

At admission, 30 patients (35.7%) were diagnosed with AN, 37 (44.0%) with BN, 15 (17.9%) with OSFED, and 2 (2.4%) with BED.

The mean age at admission was 29.9 years ($SD 7.5$) with an illness duration of 13.3 years ($SD 8.0$). The patients had received previous psychiatric treatment for a mean of 3.0 years ($SD 2.2$), of whom 50 (59.5%) had received inpatient treatment.

2.2 | Design

The study was approved by the Regional Committees for Medical and Health Research Ethics (REC), Norway (REC-number 2010/2548). The evaluation consisted of structured clinical interviews and standardized questionnaires completed before or shortly after the interview. The diagnostic interviews were conducted at six measuring points and each time with participants' informed consent: admission, discharge, 1-, 2-, 5-, and 17-year follow-up. The mean time from admission to 1-year follow-up was 1.0 ($SD 0.2$), to 2-year follow-up 2.0 ($SD 0.3$), to 5-year follow-up 5.5 years ($SD 1.0$), and to 17-year follow-up 17.0 years ($SD 1.2$).

The main interest in the present study was to examine the long-term trajectories, meaning the naturalistic course after an intensive treatment period; hence, the assessment at admission was excluded from the analysis. At the 17-year follow-up, the first author conducted all but three of the interviews, in either the patients' home (53.2%), the hospital facilities (40.3%), or at a local psychiatric outpatient clinic or the patients' workplace (6.5%). The sixth author conducted two interviews and the fourth author conducted one. The patients who did not attend the 17-year assessment did not portray any significant differences at admission, apart from a higher BMI among nonattenders (19.9 vs. 26.1, $p < .000$). This difference was accounted for by two outliers with a BMI > 45 . See Data S1 and Data S2 for information regarding attrition and drop-out at the 17-year follow-up.

2.3 | Assessments

2.3.1 | ED outcome

The *Eating Disorder Examination interview* (EDE) (Fairburn, 2008) version 17 was used to assess ED psychopathology and generate DSM-5 ED diagnoses (APA, 2013). It consists of 41 items measuring restraint, eating concern, shape concern, and weight concern. A mean value (global EDE) is calculated on a 0–6-point scale. The previous ED diagnoses based on EDE version 12 were reevaluated to enable comparison across measuring points. The Norwegian translation has adequate internal consistency and inter-rater reliability (Reas et al., 2011). The Cronbach's α for the global EDE ranged from .91 to .97 across the five assessments using EDE-12, while the α was .95 for the EDE-17. Consistent with recommendations, the global score was included in the recovery criteria to encapsulate cognitive and emotional aspects of ED (Bardone-Cone et al., 2010; Fairburn & Beglin, 1994; Williams et al., 2012). A global EDE within one standard deviation (SD) of the community population (< 1.74) was one of several requirements to categorize as recovered, while scores more than 2 SD from healthy controls (> 2.54) were

considered as no recovery. For further information regarding criteria and outcome, see Eielson et al. (2021).

The *Eating Disorder Inventory-2* (EDI-2) (Garner et al., 1983) measured self-reported ED symptoms at baseline. It consists of 91 items with a six-choice format, divided into 11 subscales. The Cronbach's α for the sum score was .95. The EDI-2 has been validated in Scandinavia (Clausen et al., 2009). The EDI-2 total score was applied for imputation only and was not examined in relation to outcome (see also Section 2.4).

2.3.2 | CM as covariates

The *Childhood Trauma Questionnaire-short form* (CTQ-SF) (Bernstein & Fink, 1998) was applied at the 17-year follow-up to assess traumatic experiences before the age of 18. To increase validity and ensure that potentially negative reactions were handled according to ethical standards, the CTQ was administered as an interview. The CTQ-SF comprises 25 questions covering five subscales: emotional abuse, emotional neglect, sexual abuse, physical abuse, and physical neglect. Scores on each subscale range from 5 to 25, altogether producing a mean CTQ score. Threshold scores for the different subscales were ≥ 8 for sexual abuse, physical abuse, and physical neglect, ≥ 10 for emotional abuse, and ≥ 15 for emotional neglect (Walker et al., 1999). The Norwegian translation has good reliability and satisfactory accuracy (Dovran et al., 2013). Due to the low Cronbach's α (.64), the subscale physical neglect was not included in the additive non-sexual trauma variable. For the remaining four subscales, the α ranged from .76 to .95. Additive non-sexual trauma was considered present when scores on at least two of the following subscales were above threshold: emotional abuse, emotional neglect, and/or physical abuse (Walker et al., 1999). The covariates of interest will hereafter be referred to as “CTQ-sexual abuse” and “CTQ-additive non-sexual trauma.”

Childhood sexual abuse (CSA). Based on previous conceptualizations, CSA was defined as any involuntary, repetitive sexual experiences with an adult that occurred before the age of 16 (Caslini et al., 2016; Sanders & Becker-Lausen, 1995). This information was collected retrospectively based upon official medical records in addition to interview data from each follow-up assessment, and the measurement was carried forward in the present article for comparison. In all, 74 cases had been categorized previously by the last author and blind-rated by the fourth author (Vrabel et al., 2010), with a kappa of .85 for the presence of CSA. For the present study, the first author categorized the remaining 10 cases, thereafter blind-rated by the last author. Inter-rater reliability was high with a kappa of 1.0 for these cases. This covariate will hereafter be referred to as “CSA.”

2.4 | Statistical analysis

Latent patterns of ED symptom changes (i.e., EDE score) throughout the follow-up period were estimated using GMM (Jung &

Wickrama, 2008). The software package Mplus version 8.1 was used for calculations. GMM examines whether the data can reveal groups that differ in mean intercept and slopes, described as latent subgroups of change over time. The method allows patients that contribute with partial data to inform the model under a missing at random assumption and accounts for repeated measurements within the same patient as well as correlation between patients (Muthén, 2004).

First, a latent growth model was identified: a latent change pattern of a GMM with only one latent class (Bauer & Curran, 2014). Several trajectories were tested to find the best fit for the data. As the sample size was smaller than what is common for latent class analysis, the complexity in the model needed to be reduced. The model was estimated with freed loadings, a linear, a curvilinear, and a cubic trajectory. Both heteroscedastic and homoscedastic residual variance was tested. The best fitting model was determined by using the likelihood ratio difference test (LRT; Raudenbush & Bryk, 2002). Maximum likelihood (ML) and maximum likelihood with robust standard errors (MLR) were used as estimators, and the MLR was kept as it contributed with necessary adjustments given the distribution of the sample (Schafer & Graham, 2002; Yuan & Zhang, 2012). Model fit was further assessed using root-mean-square error of approximation (RMSEA), and standard root-mean-square residual (SRMR), comparative fit index (CFI), and Tucker Lewis Index (TLI).

Based on the model that best described a one class trajectory over time, GMMs were estimated successively increasing up to an eight-class solution (Nagin & Odgers, 2010; Nylund-Gibson & Choi, 2018; Wolf et al., 2012). Class enumeration was guided by inspection of fit information from Akaike information criteria (AIC), Bayesian information criterion (BIC), sample size adjusted BIC (SABIC), and Lo-Mendell-Rubin (LMR). MLR allowed Mplus to calculate Vuong-Lo-Mendell-Rubin likelihood ratio test (VLMR; Wolf et al., 2012), which along with the Bootstrapped Likelihood Ratio Test (BLRT) described whether adding an extra group significantly improved the model. As recommended, the number of classes was determined in partnership with non-statistical data, such as existing research and practical utility (Bauer & Curran, 2003; Jung & Wickrama, 2008).

After identifying the optimal number of classes, we introduced three covariates to examine whether they predicted class membership. This was done using the automated ML three step approach in Mplus (Nylund-Gibson et al., 2019; Vermunt, 2010). The method ensures that the class solution does not change dependent on the covariate, but rather allows the relation between the covariate and each identified class to be estimated (Nylund-Gibson & Choi, 2018). Full-information maximum likelihood estimation of missing data does not apply for the covariates, where Mplus uses listwise deletion. Missing data was a concern regarding CTQ data, as only 62 patients participated in the assessment. This was solved using multiple imputations (Asparouhov & Muthén, 2022), generating 10 new datasets with imputations based on the samples' scores on EDE, CTQ, and CSA, in addition to EDI scores at baseline to enhance the information available in the procedure. This allowed including all 84 patients in the analyses as the following dichotomous covariates were examined: “CSA,” “CTQ-sexual abuse,” and

“CTQ-additive non-sexual trauma.” Odds ratio informed of the likelihood of class membership dependent on each covariate and enabled the “CTQ-additive non-sexual trauma” to control for the effect of “CSA” and “CTQ-sexual abuse.”

Post-hoc analyses were performed using SPSS version 29.0, applying one-way ANOVA, and Kruskal–Wallis to compare the different classes, and Mann–Whitney *U* for drop-out analyses at the 17-year follow-up. Only assessments from discharge and onward were included as the main interest was the long-term trajectory in a naturalistic context after intensive inpatient treatment. However, to avoid potential loss of information about change from admission to discharge, the reliable change index (RCI) was included as Data S3.

TABLE 1 Number and percentage of patients with scores above clinical threshold on the five subscales of the Childhood Trauma Questionnaire (CTQ) ($n = 64$).

CTQ maltreatment categories	Above clinical cut-off	Mean (SD)
Emotional abuse, n (%)	28 (45.2%)	10.1 (4.9)
Physical abuse, n (%)	13 (21%)	6.6 (3.2)
Sexual abuse, n (%)	24 (38.7%)	9.1 (6.3)
Emotional neglect, n (%)	31 (50%)	14.6 (6.5)
Physical neglect, n (%)	18 (29%)	7.1 (3.1)
Additive non-sexual trauma, n (%)	39 (62.9%)	

Note: Additive non-sexual abuse comprises emotional abuse, physical abuse, and emotional neglect. Physical neglect is excluded due to low Cronbach's α .

TABLE 2 Latent class model fit estimates.

Linear model								
Model fit index	1 class	2 class	3 class	4 class	5 class	6 class	7 class ^a	8 class ^a
Log-likelihood	646.097	661.518	635.289	623.143	616.113	610.157	598.811	594.269
AIC	1304.194	1337.035	1292.578	1276.286	1270.226	1266.313	1251.622	1250.538
BIC	1318.779	1354.051	1319.317	1312.748	1316.412	1322.222	1317.254	1325.893
SABIC	1299.852	1331.969	1284.617	1265.430	1256.476	1249.668	1232.082	1228.103
CAIC	1302.863	1335.952	1293.033	1278.927	1275.522	1274.634	1263.269	1265.770
AWE	1305.863	1339.452	1298.533	1286.427	1285.022	1286.134	1276.769	1281.270
Vuong–Lo–Mendell–Rubin		0.0002	0.0756	0.0733	0.1269	0.0076	0.0114	0.0074
Adjusted Vuong–Lo–Mendell–Rubin		0.0003	0.0852	0.0810	0.1363	0.0087	0.0129	0.0084
Bootstrap likelihood ratio test		<0.0000	<0.0000	< 0.0000	0.0845 ^b	0.0800 ^b	0.0460 ^b	0.1071 ^b
Entropy		0.875	0.859	0.862	0.874	0.830	0.893	0.854
RMSEA	0.165							
CFI	0.810							
TIL	0.864							
SRMR	0.144							

Note: bold indicates $p < 0.001$.

Abbreviations: AIC, Akaike information criteria; AWE, approximate weight of evidence; BIC, Bayesian information criteria; CAIC, consistent Akaike information criteria; CFI, comparative fit index; RMSEA, root-mean-square error of approximation; SABIC, sample-size adjusted Bayesian information criteria; SRMR, standard root-mean-square residual; TLI, Tucker Lewis Index.

^aDue to estimation problems for the models including seven to eight classes, interpretation must be done with caution.

^bThe p -value may not be trustworthy due to local maxima.

3 | RESULTS

3.1 | The prevalence of childhood trauma

Childhood trauma was common in the 62 patients who participated in the CTQ assessment at 17-year follow-up (Table 1). The majority had some exposure to all five trauma categories, as 44 patients (71%) scored above clinical cut-off for one or more CM. The average score was 47.5 (SD 17.7). Eight patients (12.9%) reported one form of CM above clinical cut-off, 13 patients (21%) reported two, 16 patients (25.8%) reported three, while 7 patients (11.3%) reported four or five CM types of clinically relevant severity. Emotional neglect was the most frequently observed, while physical neglect was the least common form of CM.

In total, 24 (38.7%) of the 62 patients at the 17-year follow-up scored above the CTQ cut-off for sexual abuse. However, categorization of CSA based on medical records identified only 16 (25.8%) of these 24 patients. For the total sample of 84 patients, 27 (32.1%) fulfilled the CSA criterion.

3.2 | Change trajectories

The final model for the one-class solution had an intercept (3.328, $p < .000$), slope (-0.266 , $p < .000$), and a homoscedastic residual variance. Models with classes running from two to eight were estimated. The variances around the class specific intercept and slope were

constrained to zero. Accordingly, differences in intercept and change between the classes had to be estimated by the differences in mean intercept and slope for the various latent classes (see Table 2 for log-likelihood, AIC, BIC, SABIC, CAIC, AWE, VLMR, AVLMR, and BLRT). Probably due to the low sample size, the analysis encountered problems with estimating one parameter (the models with seven and eight classes had two and three classes, respectively, with only one or two patients) and not replicating lowest log-likelihood (models with seven and eight classes). The fit indices for models with seven and eight classes in Table 2 should be interpreted with caution due to these estimation problems. Despite these issues, classes separated in systematic and theoretically meaningful patterns with each additional class and were largely stable across models. For class enumeration, information from the reported fit indices as well as theoretical and empirical information was considered. The fit indices BIC, CAIC, and AWE seemed to hit their lowest point in the four-class model. Furthermore, the fit indices for log-likelihood, SABIC, and AIC seemed to hit an elbow at four classes whereby each added class had diminished return on the values of the fit indices (see Table 2).

The VLMR and AVLMR favored a two-class model over a three-class model, and a three-class model over a four-class model, however the BLRT preferred four classes above three. Arguably, both three- and four-class solutions could be chosen. However, from a clinical perspective, four classes brought more nuance to poor outcome, which is where improvements are needed. Unfortunately, patients who show deterioration over time despite treatment efforts often are ignored (Presseller et al., 2022). A three-class solution would comprise a class with “continuous improvement” ($n = 49$, 58.3%,

probability = .933), a class with “low-symptomatic scores” below clinically relevant area, yet with a significant decline over time ($n = 21$, 25%, probability = .942), and a “high and stable” class ($n = 14$, 16.7%, probability = .955) with high scores and no significant change throughout the follow-up period.

For the four-class model, the entropy score was 0.862, indicating that the patients fit well into the different classes. Class counts and proportions based on the most likely membership for each patient was as follows: class one (“continuous improvement”): $n = 46$ (54.8%), probability = .924; class two (“high and declining”): $n = 19$ (22.6%), probability = .918; class three (“consistently low”): $n = 12$ (14.3%), probability = .930; class four (“high and increasing”): $n = 7$ (8.3%), probability = .929. Figure 1 shows the mean trajectories for the four classes, while Figure 2a–d displays the individual courses and estimated means in each class. “Continuous improvement” had an intercept of 3.154 ($p < .000$); it presented the steepest reduction in symptoms, with a negative coefficient of $-.384$ ($p < .000$), finally ending up below clinically significant cut-off for ED. “High and declining” had an intercept of 4.465 ($p < .000$), and a linear, significant slope with a negative coefficient of $-.177$ ($p = .028$). “Consistently low” started with EDE scores within the normal range, with an intercept of 1.207 ($p = .003$), and a linear, nonsignificant slope with a negative coefficient of $-.170$ ($p = .176$). “High and increasing” had the highest intercept, starting at 4.871, and was the only class with a significant increase in symptoms, as the slope had a positive coefficient of .186 ($p = .014$). For characteristics at admission, see Table 3. The trajectories portray the course after inpatient treatment; RCI during the treatment phase is shown in Data S3.

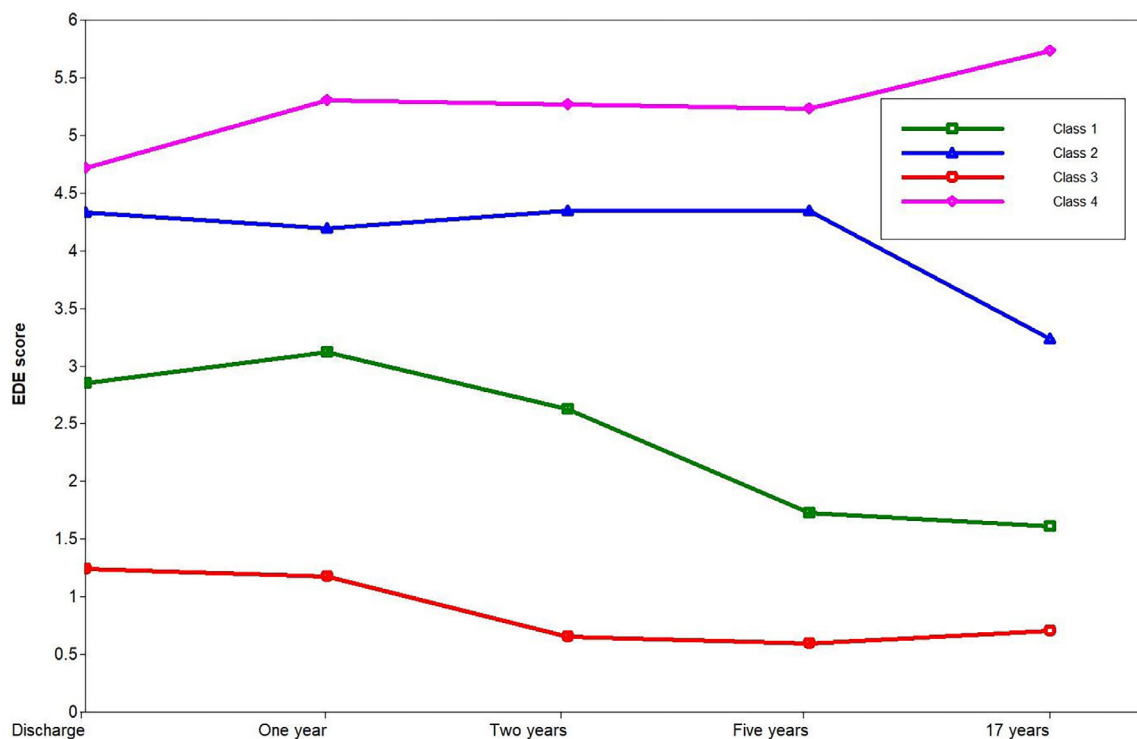


FIGURE 1 Latent class trajectories for patients with eating disorders, means for the four classes.

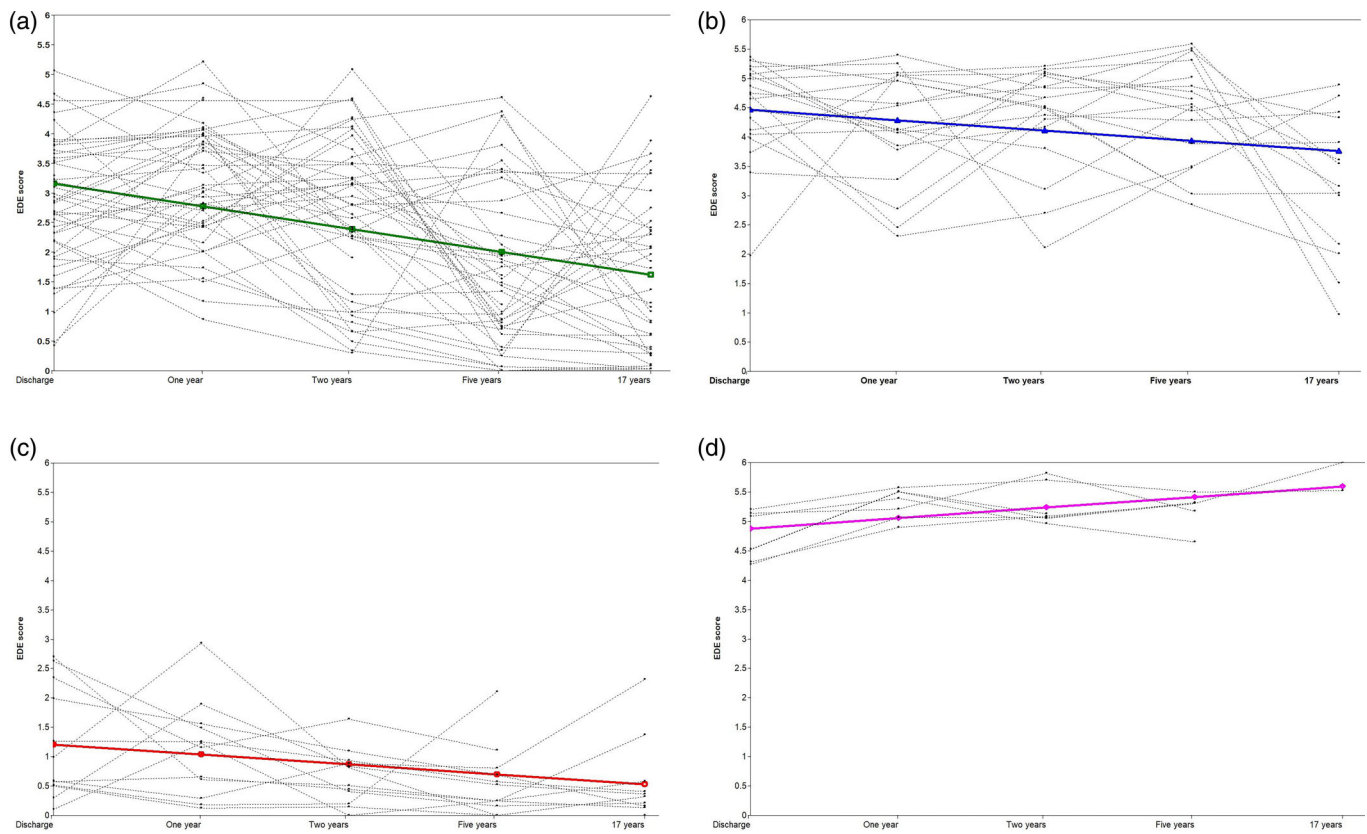


FIGURE 2 (a) Class 1 ($n = 46$), “continuous improvement,” estimated means and observed individual values. (b) Class 2 ($n = 19$), “high and declining,” estimated means and observed individual values. (c) Class 3 ($n = 12$), “consistently low,” estimated means and observed individual values. (d) Class 4 ($n = 7$), “high and increasing,” estimated means and observed individual values.

TABLE 3 Descriptive statistics for each class at admission ($N = 84$).

Variables	Continuous improvement ($n = 46$)	High and declining ($n = 19$)	Consistently low ($n = 12$)	High and increasing ($n = 7$)	$F(df)/H, p$
Age, years (mean \pm SD)	30.6 (8.4)	27.7 (4.8) ^a	28.3 (4.8)	34.4 (9.2) ^b	1.76 (3,80), $p = .042$ ¹
Duration of illness, years (mean \pm SD)	14.3 (9.0)	10.4 (6.0)	12.8 (5.2)	15.4 (9.0)	NS ¹
Duration of treatment, years (mean \pm SD)	2.9 (2.1)	3.4 (2.4)	2.6 (2.5)	3.1 (1.6)	NS ¹
BMI (mean \pm SD)	22.3 (7.5)	19.6 (5.0)	20.1 (1.8)	20.7 (7.8)	NS ¹
Full- or part-time employment, n (%)	14 (30.4)	6 (31.6)	6 (50.0)	1 (14.3)	NS ²
Married/in a relationship, n (%)	27 (58.7)	7 (36.8)	10 (83.3)	4 (57.1)	NS ²
Have children, n (%)	15 (32.6)	6 (31.6)	1 (8.3)	3 (42.9)	NS ²
EDI (mean \pm SD)	87.4 (27.1) ^a	103.9 (21.0) ^b	68.9 (33.8) ^c	112.4 (19.2) ^d	6.1 (3,80), $p < .001$ ¹
EDE (mean \pm SD)	4.1 (1.1) ^a	4.9 (0.5) ^b	3.0 (1.3) ^c	5.3 (0.2) ^d	11.46 (3,80), $p < .001$ ¹
Diagnostic distribution					
AN, n (%)	14 (30.4)	12 (63.2)	2 (16.7)	2 (28.6)	8.738 (3), $p = .033$ ²
BN, n (%)	22 (47.8)	5 (26.3)	6 (50.0)	4 (57.1)	NS ²
OSFED/BED, n (%)	10 (21.7)	2 (10.5)	4 (33.3)	1 (14.3)	NS ²

Note: Alphabetic superscripts indicate where the post-hoc comparisons found significant differences between groups.

Abbreviations: AN, anorexia nervosa; BED, binge-eating disorders; BMI, body mass index; BN, bulimia nervosa; EDE, eating disorder examination; EDI, eating disorder inventory; OSFED, other specified feeding or eating disorders.

¹One-way ANOVA.

²Kruskal–Wallis test.

3.3 | Covariates for latent trajectories

Group membership was predicted by “CSA,” whereas “CTQ-additive non-sexual trauma” and “CTQ-sexual abuse” did not have any significant impact. The likelihood of belonging to one of the two classes with the poorest long-term outcome, that is, class two (“high and declining”) and class four (“high and increasing”), was significantly increased when “CSA” was present, even when adjusting for “CTQ-additive non-sexual trauma.” In these two classes, 57.9% and 85.7%, respectively, fulfilled criteria for CSA. For comparison, the prevalence was 25% in class three (“consistently low”) and 15.2% in class one (“continuous improvement”). Given the small sample size for the “high and increasing” class in particular, the odds ratios appeared unreliable and are therefore not reported. Nonetheless, the results give an indication that patients with CSA have a higher probability of poor long-term outcome.

4 | DISCUSSION

In this 17-year follow-up of a transdiagnostic sample, childhood trauma and, notably, emotional neglect were highly prevalent. By modeling multiple trajectories, we found four latent trajectories, illustrating the heterogeneity in the long-term course for patients with longstanding ED: “continuous improvement,” “high and declining,” “consistently low,” and “high and increasing.” The odds of belonging to the two classes with the poorest outcomes was largely increased by the presence of “CSA,” but not by “CTQ-additive non-sexual trauma,” nor “CTQ-sexual abuse.”

4.1 | Prevalence of childhood trauma

While a meta-analysis found prevalence of CM ranging from 21% to 59% in patients with ED and 1%–35% among healthy controls (Molendijk et al., 2017), this was exceeded in our study, with more than 70% of patients reporting exposure to CM of some kind. Higher prevalence of CM could be related to the lengthy illness duration at admission, which is associated with higher rates of traumatic life events (Brewerton et al., 2022). Furthermore, the CTQ was administered at the 17-year follow-up, when the mean age was 46.2 years (*SD* 7.5) and the patients had received therapy for an average of 9.6 years (*SD* 5.8) (Eielsen et al., 2021). This may have affected their understanding of traumatic events during childhood, causing them to report differently than they would have at an earlier stage (Thoresen & Øverlien, 2009).

The deviation between “CSA” and “CTQ-sexual abuse” may reflect the level of trauma symptoms. Possibly, the CTQ subscale encapsulates a broader spectrum of potentially traumatic experiences that are not necessarily labeled as such by the patient. Furthermore, studies of community samples illustrate that the rate of CM is no exact mirror of the number of people struggle in the aftermath (Hazzard et al., 2019).

4.2 | Change trajectories

The four trajectories of symptom change offer a rare perspective of the very long-term outcome and the diversity among these patients, as no other studies have used GMM to examine a clinical population over such a lengthy timespan. Still, the patterns of change are not unique. A community sample following adolescents with disordered eating across 3 years identified three trajectories resembling our finding; namely “low-static,” “high intercept, decreasing over time”; and a small class with “escalating symptoms over time” (Fairweather-Schmidt & Wade, 2016). Melchior et al. (2016) examined adults receiving inpatient psychotherapy for various psychiatric illnesses, including ED, and found four trajectories sharing several features with our model: “gradual response,” “early response,” “delayed response,” and “non-response,” where the early responders presented the best outcome 6 months later. In the present study, the classes with the highest symptom scores at discharge from inpatient treatment presented the most severe symptom levels throughout the 17-year course. The findings underscore the clinical significance of categorizing patients with ED based on their change trajectories, which remained at low, moderate, or high symptom levels over the course of several decades (Crow et al., 2012). Moreover, the substantial variability in severity of symptoms at discharge bolsters the argument for pursuing personalized treatment approaches in managing these conditions (Melchior et al., 2016).

4.3 | Childhood trauma and group membership

Contrary to our hypothesis, “CTQ-additive non-sexual trauma” did not predict group membership. While other studies have found that CM, regardless of type, and particularly multi-type CM, is associated with illness severity (Molendijk et al., 2017; Ziobrowski et al., 2021), additive non-sexual trauma was equally prevalent in classes with high versus low symptom severity. With our sample's high prevalence of CM, there is little variance, probably causing some relationships to go unnoticed. “CTQ-sexual abuse” also proved to be nonsignificant for group membership, possibly due to the factors previously mentioned or lack of power due to the limited sample size. In contrast, “CSA” significantly increased the likelihood of belonging to the two classes with the poorest long-term outcome, particularly the class with “high and increasing” symptoms. While a previous publication from this longitudinal study concluded that it was the co-occurrence of CSA and avoidant PD that predicted outcome (Vrabel et al., 2010), CSA seemed to have an independent effect for these two subgroups. The differing results might be explained by the fact that all patients that dropped out were included in the present study, and most of them fulfilled criteria for CSA. Furthermore, the sample was differently divided with GMM versus the multilevel modeling used in previous analyses (Vrabel et al., 2010). Exposure to CSA has repeatedly been linked with poor outcome (Mahon et al., 2001), and the alliance with therapists might be hampered by distrust, lack of self-assertiveness, and difficulty showing vulnerability (Olofsson et al., 2020). Shame and self-criticism seem to function as

maintaining factors for both ED and post-traumatic stress disorders (Irons & Gilbert, 2005), and treatments targeting these factors, such as self-compassion therapy, have shown promising results (Kopland et al., 2023; Vrabel et al., 2019).

4.4 | Strengths and limitations

Applying GMM analysis to a transdiagnostic sample of patients with severe and enduring ED, thoroughly assessed multiple times across 17 years, gives unique insight in the long-term trajectories of change for this population. Childhood trauma was measured in multiple ways and included a validated questionnaire focusing on several aspects of CM, thus enabling us to adjust for the different kinds of exposure. Furthermore, GMM allows these variables to function as predictors, highlighting CSA's profound impact on symptom severity and outcome across two decades. However, we caution that the limited sample size violates assumptions for latent class analysis (Nylund-Gibson & Choi, 2018). It is possible that we would have found a superior fit with more classes, or differently shaped growth curve, had the sample size been larger and all models terminated normally. It is also likely that low sample size impacted the reliability of the odds ratios. Nonetheless, our exploratory study gives indications of long-term trajectories and characteristics related to outcome that can be further examined in a larger sample. Multiple imputation according to the recommendations (Asparouhov & Muthén, 2022) was performed for the CTQ covariates, reducing the concerns regarding missing data. Preferably, CSA should be assessed according to standardized and structured measurements only, however, carrying forward the previous method enabled comparison with earlier findings (Vrabel et al., 2010). Also, the CTQ ensured a formal assessment of CSA in addition. The sample mainly included adult, White women, with a severe and enduring ED, likely to restrict the generalizability of the findings as culture, ethnicity, and gender might impact both the vulnerability for ED and for various trauma exposure. Bullying and witnessing domestic violence were not included in the CTQ and socioeconomic status was not adjusted for.

5 | CONCLUSION

We found four trajectories of change in ED symptoms over the 17-year follow-up, and a high prevalence of CM. CSA significantly lowered the probability of a favorable ED outcome across decades. This highlights the importance of trauma informed care, as these patients showed little improvement over time. The findings should be further examined in a larger sample.

AUTHOR CONTRIBUTIONS

Hanna Punsvik Eielsen: Investigation; project administration; writing – original draft. **Pål Ulvenes:** Formal analysis; methodology; writing – review and editing. **Asle Hoffart:** Supervision; writing – review and editing. **Øyvind Rø:** Conceptualization; methodology;

writing – review and editing. **Jan H. Rosenvinge:** Conceptualization; methodology; writing – review and editing. **KariAnne Vrabel:** Funding acquisition; supervision; writing – review and editing.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

In agreement with the information given to the participants, we are prevented from submitting data to a public repository. In line with the ethical approval, videotapes, paper versions of the present and previous interviews, and the quantitative data are all securely stored in appropriate storage facilities. An anonymized version of the dataset can be obtained from the corresponding author upon request and in accordance with national legislation.

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SUPPORTING INFORMATION

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