

RESEARCH ARTICLE

Predicting Dropout from Intensive Outpatient Cognitive Behavioural Therapy for Binge Eating Disorder Using Pre-treatment Characteristics: A Naturalistic Study

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Abstract

Background: Dropout rates in binge eating disorder (BED) treatment are high (17–30%), and predictors of dropout are unknown.

Method: Participants were 376 patients following an intensive outpatient cognitive behavioural therapy programme for BED, 82 of whom (21.8%) dropped out of treatment. An exploratory logistic regression was performed using eating disorder variables, general psychopathology, personality and demographics to identify predictors of dropout.

Results: Binge eating pathology, preoccupations with eating, shape and weight, social adjustment, agreeableness, and social embedding appeared to be significant predictors of dropout. Also, education showed an association to dropout.

Discussion: This is one of the first studies investigating pre-treatment predictors for dropout in BED treatment. The total explained variance of the prediction model was low, yet the model correctly classified 80.6% of cases, which is comparable to other dropout studies in eating disorders. Copyright © 2016 John Wiley & Sons, Ltd and Eating Disorders Association.

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Keywords

dropout; binge eating disorder; prediction; CBT

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Introduction

Cognitive behavioural therapy (CBT) is currently the treatment of choice for binge eating disorder (BED) (American Psychiatric Association, 2006; Hay et al., 2014; National Institute of Clinical Excellence, 2004). Several studies have demonstrated that CBT is reliably effective in eliminating binge eating and in reducing associated psychopathology in the short and long term (e.g. Brownley, Berkman, Sedway, Lohr, & Bulik, 2007; Wilson, Grilo, & Vitousek, 2007). However, high dropout rates are common: controlled effect studies on CBT for BED report dropout rates varying from 16.7% (Peterson, Mitchell, Crow, Crosby, & Wonderlich, 2009), 24% (Grilo, Masheb, Wilson, Gueorguieva, & White, 2011) to 30% (Wilson, Wilfley, Agras, & Bryson, 2010). Although no naturalistic studies have been conducted on dropout in BED treatment, naturalistic studies on eating disorders in general have found dropout rates ranging from 20% to 51% for inpatients and from 29% to 73% for outpatients (Fassino, Pierò, Tomba, & Abbate-Daga, 2009). Dropout is found to be associated with demoralization, high costs, chronic psychopathology, overutilization of services, disruption in cohesion within group therapy and

demotivated patients and therapists (Ogrodniczuk, Joyce, & Piper, 2005; Olfson et al., 2009). The identification of early predictors of dropout may be important in preventing failure to complete treatment.

There are large differences among research definitions applied for dropout. Fassino et al. (2009) describe two ways to characterize the definition of dropout: (a) patient-initiated or staff-initiated premature discharge and (b) percentage of the treatment programme completed. Studies differ in the way they define dropout on either of these dimensions. The different definitions used for dropout in various studies may partially explain the wide range of dropout rates.

Studies into the prediction of dropout from eating disorder treatment investigate a multitude of predictors, and report various and inconsistent predictors. Fassino and colleagues conducted a comprehensive literature review of 26 studies, in which they found that the consistency in predetermined predictors for dropout of face-to-face treatment as well as consistency in outcome of these predictors is low. Predictors that were more consistently found to be related to dropout (which were found at least 40% of the time when the predictor was studied) were binge-purging

subtype of anorexia nervosa, low self-directedness, lower cooperativeness, difficulties relating to others and more early life events. Predictors that can be considered unrelated to dropout (which were studied in at least 10 studies but which proved significant in 10% or less of these studies) are Body Mass index (BMI), age of onset, drive for thinness, bulimic attitude, body dissatisfaction, educational level and depression (Fassino et al., 2009). In a more recent review, Vall and Wade (2015) conducted a meta-analysis for dropout prediction of face-to-face eating disorder treatment. The amount of studies incorporated varied between predictors, with a minimum of three and a maximum of nine studies. They found the following predictors for dropout: binge-purging subtype of anorexia nervosa, frequency of binge/purge behaviours, less motivation for treatment, more comorbid psychopathology and more impulsivity. Two predictors were found to be unrelated to dropout: weight suppression (which is the difference between highest weight during adulthood and pre-treatment weight) and depressive symptoms (Vall & Wade, 2015). Even though several studies have found that treatment dropouts showed higher initial levels of depression than treatment completers in the treatment of eating disorders (e.g. Jones et al., 2012; Peake, Limbert, & Whitehead, 2005; Peñas-Lledó et al., 2013), depression eventually did not stand out as a relevant predictor of dropout (Fassino et al., 2009; Peake et al., 2005; Vall & Wade, 2015).

So far, research into the prediction of dropout of BED treatment has been scarce. Thompson-Brenner et al. (2013) combined the data of 11 studies on treatment of BED to study dropout and found that older age and being of African-American ethnicity were predictive of dropout. They found no evidence for the following predictors of dropout: number of objective binges, BMI, education and treatment duration. Flückiger and colleagues showed that also therapy process variables were predictive of dropout (with $N=78$ patients). Unfortunately, the study did not include pre-treatment variables (Flückiger et al., 2011).

Some studies did not perform prediction analyses but did test for differences between dropouts and completers in face-to-face BED treatment, which may indicate potential predictors for dropout. One study showed that dropouts reported significantly lower social embedding, more anxiety, more somatic problems, higher depression scores and were less conscientious than treatment completers (Deumens, Noorthoorn, & Verbraak, 2012). In a follow-up on this study, Lammers and colleagues again found that dropouts reported lower social embedding and were less conscientious. This study also found that dropouts were less agreeable than treatment completers (Lammers, Vroling, Ouwens, Engels, & van Strien, 2015). It should be noted that although differences between dropouts and completers can indicate potential predictors for dropout, it does not necessarily imply that such variables are indeed predictive of dropout (as is the case with, for instance, depression).

Very few studies have focussed on the prediction of dropout in BED treatment using pre-treatment characteristics. The present study is aimed at the identification of predictors of dropout in the treatment of BED. We define dropout as patient-initiated or staff-initiated premature discharge not because of sufficient improvement of the eating disorder. To optimize external validity, we made use of a naturalistic sample. Because there were no previous studies predicting dropout using pre-treatment

characteristics, the current study employs an exploratory approach. A wide range of variables was included based on studies on dropout across eating disorders, such as eating disorder characteristics, general psychopathology, personality traits and demographics.

Methods and materials

Dropout definition

Dropout was defined as patient-initiated or staff-initiated premature discharge ($n=82$). When staff and patient mutually agreed, during the regular 10-week evaluation, that treatment goals were accomplished, and therefore treatment was no longer indicated; this was not considered as dropout but as completion of the treatment ($n=3$).

Participants

Participants were 376 patients¹ (347 women and 29 men) entering the intensive outpatient CBT programme for BED. Dropout percentage was 21.8% (76 women and 6 men), whereas 78.2% (271 women and 23 men) completed treatment. Mean age of these 376 patients was 36.5 years ($SD=10.21$, range 18–61). Mean BMI was 42.0 kg/m² ($SD=7.46$, range 25–80 kg/m²).

Procedure and design

The study was a naturalistic cohort study. The cohort contained all patients entering an intensive outpatient CBT programme for BED at the Amarum Expert Centre for Eating Disorders in the Netherlands between September 2003 and April 2011 that had provided informed consent. Inclusion and exclusion criteria for the intensive outpatient CBT programme for BED are described in detail by Lammers et al., 2015.² At the start of treatment, questionnaires measuring eating disorder characteristics, general psychopathology, personality traits and demographic information were administered. After treatment, dropout was identified. Dropout was treated as a binomial outcome variable.

Treatment

Patients were offered 20 group sessions of one day each, for 20 consecutive weeks. A treatment day consisted of three therapy components of 75 min each: discussing daily self-monitoring of eating behaviour, cognitive therapy and psychomotor therapy (a body-oriented and movement-oriented therapy). Besides that, weight was monitored weekly. The main goal of treatment was

¹Originally, 431 participants entered the study. However, one of the questionnaires (NEO-PI-R) was added only during the study, meaning that 53 participants did not fill out the NEO-PI-R. The missingness of the NEO-PI-R was completely at random (Little's Missing Completely at Random test $p=.97$). We therefore decided to exclude participants who did not fill out the NEO-PI-R, leaving a total of 376 participants. In addition, two participants were forced to discontinue treatment for medical reasons unrelated to their BED. They were also excluded from the data set.

²The present study was part of a larger study measuring outcome in terms of treatment effects and dropout as well as predictors for treatment outcome and dropout. Data on treatment outcome and prediction of treatment outcome have been published elsewhere: Deumens et al., 2012 and Lammers et al., 2015.

to help patients regain control over their eating. This was established by stimulating a regular and sufficient eating pattern as well as stimulating to stop bingeing. Therapy further focused on the development of a more realistic body image, on decreasing body dissatisfaction and on diminishing the influence of shape and weight on self-esteem. The intensive outpatient CBT programme for BED was based on the manual developed by Fairburn, Marcus, and Wilson (1993) and was led by a psychologist, a sociotherapist and a psychomotor therapist. Patients were allowed to miss a maximum of 3 days in 20 weeks time. Up to nine patients could participate in each round of the 1-day group treatment. The group had a half open group format: new patients could enter every 10th week. Additionally, six informative group meetings of 90 min each were held for patients and their partners. The main goal of these meetings was to enhance mutual understanding and support during the process of change. After 10 weeks, all patients were evaluated on their treatment progress in a staff-meeting and in the treatment-group. For more details about the treatment, see Lammers et al. (2015).

Materials

Eating Disorder Inventory

The Dutch translation of the Eating Disorder Inventory (EDI-1) was used as a measure for eating disorder psychopathology (Garner, Olmstead, & Polivy, 1983; Schoemaker, Van Strien, & Van der Staak, 1994). The EDI-1 consists of 64 items covering psychological and behavioural eating disorder symptomatology (range 0–384). Items such as ‘I feel extremely guilty after overeating’ are answered on a 6-point Likert scale. The EDI-1 consists of eight subscales: drive for thinness (7 items), bulimia (7 items), body dissatisfaction (9 items), ineffectiveness (10 items), perfectionism (6 items), interpersonal distrust (7 items), interoceptive awareness (10 items) and maturity fears (8 items). Higher scores indicate higher eating disorder psychopathology. The reliability and the validity are considered to be good in eating disorder patient groups (Garner, 1991; Garner et al., 1983; van Strien, 2002; Welch, Hall, & Norring, 1990). Internal consistency proved to be good in the present sample ($\alpha = 0.804$).

Eating Disorder Evaluation Scale

The Eating Disorder Evaluation Scale (EDES) was used as a second measure for eating disorder psychopathology (Norré & Vandereycken, 1993; Vandereycken, 1993). The EDES is a self-report questionnaire that consists of 15 questions (range 0–90). There are four subscales: anorectic preoccupation (5 items), bulimic behaviour (3 items), sexuality (3 items) and social adjustment (4 items). Lower scores indicate higher eating disorder psychopathology. The test has a good reliability and validity (Norré & Vandereycken, 1993; Vandereycken, 1993). Unfortunately, we have only subscale score records for this test. Therefore, no internal consistency could be calculated.

Binge Eating Trigger Checklist

The Binge Eating Trigger Checklist (BETCH) is a questionnaire designed to investigate what kind of triggers precede a binge. For each trigger (75 in total), people answer whether the trigger precedes a binge yes or no (e.g. *I felt excluded; I was bored; I was*

worried about my future; I felt fat). Furthermore, some questions concerning the amount of food eaten, the frequency of such binges and compensatory behaviours are asked. The BETCH is a clinical tool meant to investigate what kind of triggers precede a binge and is not meant as a sum-up questionnaire (Vanderlinden et al., 2004). We did not use the complete BETCH, but we did make use of five questions of the BETCH: four to check for compensatory behaviour and one to check for the number of binges per week. These questions are: *After a binge eating episode, will you start fasting?* (Yes/No); *After a binge eating episode, will you start vomiting?* (Yes/No); *After a binge eating episode, will you start laxation?* (Yes/No); *After a binge eating episode, will you start excessive exercise?* (Yes/No); *How often do these binge eating episodes occur?* (enter average per day/week/month) (Vanderlinden et al., 2004).

Symptom Checklist 90

The Dutch version of the Symptom Checklist 90 (SCL-90) was used to measure general psychopathology (Arrindell & Ettema, 2003). The SCL-90 consists of 90 items on the severity of experienced physical (e.g. suffering from headache) and psychological (e.g. feeling lonely) complaints during the previous week, which are answered on a 5-point Likert scale (range 90–450). Patients answer the degree they feel bothered by complaints. The SCL-90 comprises eight subscales: agoraphobia (7 items), anxiety (10 items), depression (16 items), somatization (12 items), insufficiency (9 items), distrust (18 items), hostility (6 items) and sleeplessness (3 items). The items can be summed for a total score, indicating a general level of psychopathology. Higher scores indicate a higher level of psychopathology. Reliability and validity of the Dutch version of the SCL-90 proved to be good (Arrindell & Ettema, 2003). Internal consistency proved to be excellent in the present sample ($\alpha = 0.972$).

The Beck Depression Inventory

The Dutch version of the Beck Depression Inventory (BDI) was used to measure levels of depression (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961; Bouman, Luteijn, Albersnagel, & Van der Ploeg, 1985). The BDI consists of 21 questions on the severity of depressive complaints in the last week. These questions are answered on a scale of 0 to 3, e.g.: 0) *I do not feel sad*; 1) *I feel sad*; 2) *I am sad all the time and I can't snap out of it*; 3) *I am so sad or unhappy that I can't stand it*. The 21 items are summed for a total score (range 0–63). Higher scores indicate higher levels of depression. The reliability and validity of the Dutch version of the BDI proved to be good (Beck, Steer, & Garbin, 1988; Bouman et al., 1985). Internal consistency proved to be good in the present sample ($\alpha = 0.849$).

Revised Neuroticism–Extraversion–Openness Personality Inventory

The Dutch version of the Revised Neuroticism–Extraversion–Openness Personality Inventory (NEO-PI-R) was used to assess personality characteristics (Costa & McCrae, 1992; Hoekstra, Ormel, & de Fruyt, 1996). The NEO-PI-R consists of 240 items such as ‘I sometimes have wild ideas’ which are answered on a 5-point Likert scale (range per scale 48–240). The NEO-PI-R consists of five personality dimensions, each measured with 48 items:

extraversion, neuroticism, openness, agreeableness and conscientiousness. Higher scores indicate a higher level of the specific personality dimension. The reliability and validity proved to be good (e.g. Costa & Widiger, 1994; Piedmont, 1998). Internal consistency proved to be acceptable in the present sample ($\alpha = 0.712$).

Background variables

In addition to the above-mentioned questionnaires, patients were measured for height and weight through which we computed their BMI (kg/m^2) and were asked for demographics: They were asked about *daytime activity* (I go to school/college/university; I have a job; I am on sick leave; I do volunteer work; I am looking for a job; I don't have a job). Patients who were employed, currently active as a student or doing volunteer work were labelled as having a daytime activity, whereas patients who were unemployed and not studying were labelled as without daytime activity. Marital status (I am married; I am divorced; I am a widow(er); I have a romantic partner; I am single) and living situation (I live on my own; I live with my parents; I live with my partner; else, namely....) were asked for to be able to determine 'social embedding' (in line with Deumens et al. [2012] and Lammers et al. [2015]). Those patients that were married, in a romantic relationship or living with their parents were rated as having a high social embedding, whereas those patients that did not have a romantic relationship (who rated that they were divorced, a widow(er) or single) and who reported living alone were rated as having low social embedding. Furthermore, *level of education* (low, medium and high) was determined: primary education and lowest level of vocational education were coded as 'low education', pre-vocational and vocational education were coded as 'medium education' and higher vocational (professional) education, pre-university education and university were coded as 'high education'.

Statistical analysis

Before performing analyses, we explored the data for incomplete records. A maximum of three missing cases per variable was found. For questionnaires that consist of multiple scales, missing values were estimated with an expectation maximization analysis. Any missing values on the BDI were replaced by the group mean.

Because so far only few predictors for dropout from BED treatment have been identified, we applied an exploratory method of analysis. As a first step, to identify possible relevant predictors, all continuous variables were included in separate ANOVA's as independent variables with dropout as dependent variable. For all categorical variables, a chi-squared test was used. Following the Hosmer and Lemeshow criterion (Hosmer & Lemeshow, 2000), all variables with p -value below 0.2 were considered potentially relevant and were entered in a logistic regression, with dropout as dependent variable. All categorical variables were dummy coded (0, 1), with level of education (the only categorical variable with more than two levels, namely low/medium/high) being split up into 'low level of education' (0, 1) and 'medium level of education' (0, 1). If the chi-squared test for either of the education dummies meets the Hosmer and Lemeshow criterion, both dummies will be entered in the regression analysis (as the two dummies together represent three levels of education, because patients that have a high level of education score 0 on the dummies

for both low and medium level of education). A forced entry backward deselection procedure was used to isolate significant predictors of dropout. Wald statistic was used for the deselection procedure. The model fit as expressed by McFadden's pseudo R^2 was inspected at each step. IBM SPSS 21 (IBM Corp, 2012) was used for data analysis.

Results

Tables 1 and 2 present information about the initially selected predictors for dropout: EDI-scales, EDES-scales, binge eating episodes per week, occurrence of vomiting, fasting, laxative use and excessive body activity after a binge, SCL-90-scales, BDI, NEO-PI-R-scales, age, gender, social embedding, daytime activity, level of education and BMI.

The following predictors showed p -values lower than $p = .20$ and were included in the multivariate prediction analysis: EDI bulimia scale, EDI maturity fears scale, EDES anorectic preoccupation scale, EDES social adjustment scale, fasting after a binge, vomiting after a binge, number of binges per week, SCL-90 anxiety scale, SCL-90 agoraphobia scale, SCL-90 somatization scale, NEO-PI-R neuroticism scale, NEO-PI-R agreeableness scale, NEO-PI-R conscientiousness scale, daytime activity and social embedding. See Tables 1 and 2 for all comparisons.

The final logistic regression model included the EDI bulimia scale, EDES anorectic preoccupation scale, EDES social adjustment scale, NEO-PI-R agreeableness scale, low and medium level of education and social embedding. This model explained 10.4 % of the variance (McFaddens R square = 0.104, log likelihood change = 395.87–354.55), which may be valued as reasonable, and was able to correctly classify 80.6% of the cases. Low social embedding ($\text{Ex}(B) = 0.33$, $p < .01$), not fulfilling medium level of education³ ($\text{Ex}(B) = 0.57$, $p = .04$), less EDI bulimia ($\text{Ex}(B) = 0.93$, $p = .04$), lower EDES anorectic preoccupation scores ($\text{Ex}(b) = 0.92$, $p = .03$), lower EDES social adjustment scores ($\text{Ex}(b) = 0.93$, $p = .02$) and less NEO-PI-R agreeableness ($\text{Ex}(b) = 0.98$, $p < .01$) significantly predicted dropout. In case of the EDES scales, we need to keep in mind that lower scores imply more psychopathology, so dropout is related to more anorectic preoccupation and to more problems in social adjustment. We observed no co-linearity between these final variables: the variance inflation factors were between 1000 and 1.013, which is well below threshold (O'Brien, 2007). See Table 3 for details of the final model.

Discussion

This study aimed to identify pre-treatment predictors of dropout from CBT treatment for BED in a naturalistic study. Because only very little is known about the prediction of dropout in BED, we made use of an exploratory analysis. A range of variables were included: eating disorder characteristics, general psychopathology, personality traits and demographics. In the present study,

³Note that 'not fulfilling a medium level of education predicted dropout' does not mean that a lower level of education predicted dropout. Level of education was dummy coded 'low level of education' (0, 1) and 'medium level of education' (0, 1). To be able to conclude that the current 'not fulfilling a medium level of education' means having a lower-than-medium education, 'low level of education' should also predict dropout, which it doesn't.

Table 1 Univariable associations of discrete variables regarding demographic and eating disorder characteristics comparing treatment completers versus dropouts using chi-squared tests

	Total		Completers		Dropouts		Test statistic Pearson chi-squared
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Total	376	100	294	78.2	82	21.8	
Demographic Variables							
Female	347	92.3	271	92.2	76	92.7	0.02
Low social embedding	113	30.1	73	24.8	40	48.8	17.50**
Having daytime activity	254	67.6	205	69.7	49	59.8	2.91°
Level of education							
Low	40	10.6	35	11.9	5	6.1	2.27°
Medium	192	51.1	145	49.3	47	57.3	1.64
High	144	38.3	114	38.8	30	36.5	0.13
Eating Disorder Variables							
Vomiting	14	3.7	13	4.4	1	1.2	1.83°
Fasting	67	17.8	46	15.6	21	25.6	4.35*
Laxative use	8	2.1	6	2.0	2	2.4	0.05
Excessive body activity	80	21.3	59	20.1	21	25.6	1.18

Note:

° $p < .2$

* $p < .05$

** $p < .01$

21.81% of the patients dropped out of treatment. Of the eating disorder characteristics, lower bulimia scores, lower anorectic preoccupation scores and lower psychosocial adjustment scores were found to be predictive of dropout, whereas binges per week, EDI subscales, compensatory behaviours and BMI were found not to predict dropout. General psychopathology (depression and SCL-90 subscales) did not predict dropout. With respect to personality traits, it was found that less agreeableness was predictive of dropout, whereas neuroticism, extraversion, openness to experience and conscientiousness were not predictive. In terms of demographics, low social embedding and (medium) education were found to predict dropout, whereas age, gender and daytime activity were unipredictive of dropout. As this is one of the first studies focusing on dropout prediction in a BED population, these findings are an important first step in reducing the dropout rates in BED-treatment.

Patients with lower EDI-Bulimia scores have a higher chance of dropout than patients with higher EDI-Bulimia scores, meaning that those with less binge eating pathology are more likely to drop out of treatment. In the meantime, the EDES-bulimic subscale was unipredictive of dropout. It should be noted that the EDES-bulimic subscale consists of only three items that ask for bingeing and two types of compensatory behaviour, which are related to bulimia nervosa, whereas the EDI-Bulimia subscale consists of seven items measuring bingeing, eating in secrecy and responding to stress with (over)eating, which is relevant to bulimia nervosa and BED. Thus, the EDI-Bulimia subscale is more relevant to BED behaviour. An ecologically valid interpretation of EDI-Bulimia predicting dropout would be that those patients that have less binge eating pathology drop out because the treatment programme is an intensive outpatient treatment, for which patients have to be at the treatment facility for six hours per week. The time invested may not match the

burden felt by their binge eating disorder. Remarkably, this predictor has not been found in other studies on dropout in eating disorders (e.g. Fassino et al., 2009; Thompson-Brenner et al., 2013; Vall & Wade, 2015). For instance, Fassino and colleagues found that bulimic attitude was only predictive of dropout in 2 out of 22 studies that considered it as a predictor. These 22 studies have included both outpatient and more intensive forms of treatment yet have mostly focused on anorexia nervosa and bulimia nervosa, for which intensive treatment likely better matches the severity of the illness (Fassino et al., 2009; Thompson-Brenner et al., 2013; Vall & Wade, 2015). Future studies should aim to interview dropped out patients to help interpret the present finding.

Patients with lower scores on anorectic preoccupations were found to have a higher change of dropout than patients with high scores. The subscale anorectic preoccupations measures the level of over/underweight (but does not differentiate at more extreme levels of over/underweight such as in the present population) and preoccupations with eating, body weight and body shape. Such preoccupations (or shape and weight concerns, as measured by the Eating Disorder Examination Questionnaire (EDEQ); Fairburn & Beglin, 1994) have not been found as predictor in other studies on dropout in eating disorders (Fassino et al., 2009; Vall & Wade, 2015), but it should be noted that only one study so far has focused on pre-treatment predictors of dropout in BED treatment (Thompson-Brenner et al., 2013). The finding of anorectic preoccupations as predictor of dropout seems remarkable, as the present treatment included psychomotor therapy, which aims at diminishing body dissatisfaction and creating a more realistic body image which should result in a reduction in shape and weight concerns.

Patients with poor social adjustment have a higher chance of dropout than patients with very good social adjustment. This is

Table 2 Univariable associations of continuous variables regarding demographic, eating disorder characteristics, general psychopathology and personality traits comparing treatment completers versus dropouts using *t*-tests

	Total <i>M</i> (<i>SD</i>)	Completers <i>M</i> (<i>SD</i>)	Dropouts <i>M</i> (<i>SD</i>)	Test statistic <i>F</i>
<i>N</i>	376	294	82	
Demographic variables				
Age	36.45 (10.21)	36.38 (10.14)	36.67 (10.49)	0.51
Eating disorder characteristics				
Binge eating/week	1.17 (2.94)	1.27 (3.20)	.80 (1.66)	7.30°
Body mass index	42.02 (7.46)	41.89 (6.95)	42.48 (9.08)	3.11
EDI drive for thinness	9.90 (5.11)	9.73 (5.11)	10.51 (5.07)	0.40
EDI bulimia	7.29 (4.26)	7.44 (4.16)	6.74 (4.58)	0.56°
EDI body dissatisfaction	21.84 (6.08)	21.98(6.18)	21.35 (5.71)	0.34
EDI interoceptive awareness	6.79 (4.67)	6.74(4.78)	6.99 (4.30)	0.76
EDI ineffectiveness	9.49 (6.23)	9.29(6.28)	10.23 (6.02)	0.27
EDI perfectionism	4.21 (3.66)	4.25(3.76)	4.08 (3.30)	1.49
EDI interpersonal distrust	4.40 (3.76)	4.29(3.77)	4.77 (3.70)	0.02
EDI maturity fear	3.62 (3.23)	3.46 (3.04)	4.21 (3.80)	4.52°
EDES anorectic preoccupation	9.11 (3.68)	9.26 (3.49)	8.60 (4.27)	4.04°
EDES bulimic scale	13.59 (2.11)	13.53 (2.11)	13.79 (2.12)	0.12
EDES sexuality scale	10.52 (4.13)	10.62 (4.08)	10.16 (4.31)	0.10
EDES social adjustment scale	15.45 (4.26)	15.78 (4.10)	14.26 (4.64)	2.68**
General Psychopathology				
SCL-90 anxiety	18.65 (7.04)	18.19 (6.65)	20.29 (8.12)	8.27*
SCL-90 agoraphobia	11.07 (4.44)	10.74 (4.28)	12.27 (4.82)	2.11**
SCL-90 depression	37.50 (12.31)	37.21 (12.21)	38.54 (12.66)	0.39
SCL-90 somatization	24.99 (8.35)	24.49 (8.11)	26.79 (8.96)	2.01*
SCL-90 insufficiency	20.54 (6.60)	20.35 (6.43)	21.22 (7.19)	1.94
SCL-90 distrust	39.13 (11.87)	38.75 (11.42)	40.49 (13.32)	2.30
SCL-90 hostility	9.81 (3.20)	9.82 (3.26)	9.74 (3.00)	0.46
SCL-90 sleeplessness	6.56 (2.99)	6.52 (2.93)	6.72 (3.22)	0.30
BDI	18.61 (8.32)	18.36 (8.25)	19.54 (8.57)	1.58
Personality traits				
NEO-PI-R neuroticism	164.21 (22.59)	163.36 (23.42)	167.24 (19.17)	2.01°
NEO-PI-R extraversion	143.14 (20.22)	143.47 (19.58)	141.99 (22.45)	3.62
NEO-PI-R openness to experience	155.19 (17.66)	154.97 (17.41)	155.99 (18.61)	1.38
NEO-PI-R agreeableness	173.50 (15.41)	174.64 (15.15)	169.41 (15.74)	0.68**
NEO-PI-R conscientiousness	147.90 (20.29)	148.85 (20.50)	144.50 (19.24)	0.01°

Note:

EDI, Eating Disorder Inventory; EDES, Eating Disorder Evaluation Scale; SCL-90, Symptom Checklist 90; BDI, Beck Depression Inventory; NEO-PI-R, Revised Neuroticism–Extraversion–Openness Personality Inventory.

° $p < .2$

* $p < .05$

** $p < .01$

in line with a study by Peake et al. (2005), in which they found indications that poor social adjustment could be predictive of dropout in an eating disorder sample. To the best of our knowledge, this is the only other study so far focusing on social adjustment as predictor of dropout in an eating disorder sample. The social adjustment scale measures social functioning in general as well as professional and relational functioning. Relational functioning may be relevant for treatment and even more relevant for group treatment, as one needs to relate to both the therapist and group members. Related to the construct of social adjustment is ‘difficulties in relating to others’, which has been found to be a stable predictor for dropout from eating disorder treatment (Fassino et al., 2009).

Patients with very low agreeableness have a higher chance of dropout than patients with very high agreeableness. Although not studied in relation to eating disorders, agreeableness has been studied in relation to dropout in other psychological disorders and has presented mixed results: agreeableness was found to be unrelated to dropout in the treatment of complicated grief (Ogrodniczuk, Piper, Joyce, McCallum, & Rosie, 2003) and post-traumatic stress disorder (van Emmerik, Kamphuis, Noordhof, & Emmelkamp, 2011), whereas lower agreeableness was found to be predictive of dropout in the treatment of pathological gambling (Ramos-Grille, Gomà-i-Freixanet, Aragay, Valero, & Vallès, 2013). It should be noted that these studies all made use of individual therapy. It could

Table 3 Final logistic regression model using fixed backward deselection

	B-weight	Ex(B) (95% CI)	p-value
Low social embedding	-1.10	0.33 (0.19–0.57)	<.01**
Level of education low	0.56	1.75 (0.81–3.78)	.16
Level of education medium	-0.57	0.57 (0.33–0.96)	.04*
EDI bulimia	-0.07	0.93 (0.87–0.99)	.04*
EDES anorectic preoccupation	-0.09	0.92 (0.85–0.99)	.03*
EDES social adjustment scale	-0.07	0.93 (0.87–1.00)	.02*
NEO-PI-R agreeableness	-0.02	0.98 (0.96–0.99)	.01*
Constant	5.64		<.01**

Note:

EDI, Eating Disorder Inventory; EDES, Eating Disorder Evaluation Scale; NEO-PI-R, Revised Neuroticism–Extraversion–Openness Personality Inventory, CI, Confidence Interval.

* $p < .05$

** $p < .01$

be that receiving therapy in a group is difficult for patients with low agreeableness. Low agreeable people are characterized by (for instance) little trust, uncooperativeness and irritability (Costa & Widiger, 2002). These factors may be hard to combine with being open about your psychological troubles within a group of people and with building a working alliance (Hirsh, Quilty, Bagby, & McMMain, 2012). More research is needed to determine whether people with low agreeableness characteristics are better served with individual therapy, or whether dropout from (group) therapy can be prevented by, for instance, paying extra attention to building a working alliance and a safe group environment.

The dummy coded predictor ‘medium education’ was found to be negatively associated with dropout, meaning that a lack of medium education enhances the risk of dropout. The finding of level of education being related to dropout is inconsistent with the only other study on drop out in BED treatment (Thompson-Brenner et al., 2013), as well as with (most) other dropout prediction studies in eating disorders (Fassino et al., 2009). Whether this difference stems from a difference in defining level of education is not completely clear. Several studies are unclear on how level of education was determined (e.g. Mahon, Bradley, Harvey, Winston, & Palmer, 2001; Van Strien, Van der Ham, & Van Engeland, 1992), whereas other studies turn out to make use of a different categorization by, for instance, classifying ‘high school’ as lower education and ‘having started any type of college’ as medium or higher education (e.g. Fassino, Abbate-Daga, Pireo, Leombruni, & Rovera, 2003; Thompson-Brenner et al., 2013). In comparison, in the present study, we categorized various levels of high school under different levels of education (based on difficulty/whether they prepare for vocational education or university). This means that those patients that were classified as having lower education in other studies can be found in either of the levels of our study. This complicates the direct comparison of findings. Whether the presently found ‘not fulfilling medium level of education’ predictor for dropout means having a lower-than-medium or a higher-than-medium education remains unclear, also because the dummy coded predictor ‘low education’ was not predictive of dropout (yet reached a $p = .16$ with $n = 40$). As such, the present finding is difficult to interpret. Future studies

on predictors for dropout from BED treatment should clarify the predictive role of education.

Patients with low social embedding have a higher chance of dropping out of the treatment than patients with high social embedding. This corroborates and extends the findings from prior studies, where treatment dropouts were found to have lower social embedding than treatment completers (Deumens et al., 2012; Lammers et al., 2015). When one has a high social embedding, one either comes home to someone or lives in a romantic relationship. With high social embedding comes being able to talk to someone on a daily basis. This person may function as a support system the patient may reflect their thoughts to. Also, people with high social embedding are more likely to eat together. These are likely to be desirable conditions for treatment because of social control and social support. Also, without these conditions, it becomes harder to talk about treatment and the eating disorder. As such, frustrations regarding treatment, the therapist or group members are difficult to discuss, which may perhaps lead to a quicker dropout for low socially embedded patients.

Next to the importance of significant predictors for dropout are those variables that turned out not to predict dropout. In line with the literature (Fassino et al., 2009; Thompson-Brenner et al., 2013; Vall & Wade, 2015), we found (among other things) that drive for thinness, body dissatisfaction and depression were not predictive of dropout from CBT group-treatment for BED. Also, we found no evidence that comorbid psychopathology was predictive of dropout, which is contrasting the findings of Vall and Wade (2015). However, none of the studies included in Vall and Wade’s meta-analysis had included patients suffering from BED.

A clear strength of the present study was the large homogeneous population. All data were collected within one institute, on only two locations, with the same protocol. It is, nevertheless, important and interesting to replicate this study among different institutes to see whether our findings can be replicated and can be translated to other treatment facilities. In addition, as we are currently only providing post hoc interpretations on how the found predictors would lead to dropout, it would be informative to ask patients about their reasons for drop out. This could, for instance, tell us whether indeed patients with relatively little eating disorder burden (as indicated by the EDI-Bulimia subscale) feel that the effort of coming to therapy is too big and could shed light on what reasons patients with low agreeableness have for not continuing their group therapy. It would be informative to compare such interviews with interviews of patients who did complete treatment. To the best of our knowledge, such interview studies have not yet been performed in eating disorder dropout research.

The modest explained variance should be noted as a limitation, as it limits the clinical relevance of the outcome. The current study revealed only 10% explained variance in a population of $N = 376$ and 22% dropout. This may imply that the present focus on eating disorder characteristics, general psychopathology, personality and demographics is not broad (or specific) enough, or it could imply that dropout is difficult to predict. On the other hand, the present model is able to accurately predict 80.6% of the dropout cases. This accuracy level is comparable to or better than other prediction models for dropout in eating disorder treatment (64%–78.8%; e.g. Agras et al., 2000; Blouin et al., 1995; Waller, 1997). These studies do not report percentage explained

variance. Yet the fact that the accuracy percentages are comparable may lead to the tentative conclusion that percentage explained variance for the other studies would be comparable (and hence, low).

In conclusion, when it comes to the prediction of dropout from CBT treatment for BED, we find that eating disorder characteristics can partly predict dropout. Most importantly, patients with less severe binge eating complaints (as measures by EDI-Bulimia) drop out more quickly. Furthermore, patients that are more preoccupied with their eating, shape and weight drop out more quickly, as are those with lower psychosocial adjustment.

General psychopathology was found to be unrelated to dropout. In terms of personality, lower agreeableness was found to predict dropout, yet other personality factors did not. Also, in terms of demographics, those patients that have low social embedding (that live alone and are not in a romantic relationship) have a higher risk of dropout. How education adds to this picture remains to be seen. It might be worthwhile to pay special attention to patients that meet the predictors for dropout prior to or during the treatment of BED. Future studies should test whether intervening on these predictors can contribute to the prevention of dropout.

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