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ORIGINAL ARTICLE

# Recovery from eating disorder 1 year after start of treatment is related to better mentalization and strong reduction of sensitivity to others

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**Abstract**
*Purpose* To investigate whether recovery from an eating disorder is related to pre-treatment attachment and mentalization and/or to improvement of attachment and mentalization during treatment.
*Method* For a sample of 38 anorexia nervosa (AN) and bulimia nervosa (BN) patients receiving treatment the relations between attachment security, mentalization, comorbidity and recovery status after 12 months (not recovered or recovered), and after 18 months (persistently ill, relapsed, newly recovered, or persistently recovered) were investigated. Attachment security and mentalization were assessed by the Adult Attachment Interview at the start of the treatment and after 12 months. Besides assessing co-morbidity—for its effect on treatment outcome—we measured psycho-neuroticism and autonomy because of their established relations to both eating disorder symptoms and to attachment security.
*Results* Recovery both at 12 months and at 18 months was related to higher levels of mentalization; for attachment, no significant differences were found between recovered and unrecovered patients. Patients who recovered from AN or BN also improved on co-morbid symptoms: whereas pre-treatment symptom severity was similar, at 12 months recovered patients scored lower on co-morbid personality disorders, anxiety, depression, self-injurious behaviour and psycho-neuroticism than unrecovered patients. Improvement on autonomy (reduced sensitivity to others; greater capacity to manage new situations) in 1 year of treatment was significantly higher in recovered than in unrecovered patients.
*Conclusion* A focus on enhancing mentalization in eating disorder treatment might be useful to increase the chances of successful treatment. Improvement of autonomy might be the mechanism of change in recovering from AN or BN.
*Level of Evidence* Level III cohort study.

**Keywords** Attachment · Mentalization · Recovery · AAI · Autonomy · Eating disorders

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## Introduction

Several recent reviews on attachment research in eating disorders underpin the importance of attachment security and mentalization for understanding and treating eating disorders [1–3]. Attachment behaviour aims at attaining proximity to an attachment figure, and finding protection and comfort in moments of fear and danger. The pattern of attachment interactions between child and parent is internalized as a working model of attachment that will model

behaviour in intimate relations throughout the lifespan [4]. Parental sensitivity, responsiveness and predictability in interacting with the child contribute to a secure attachment bond [5]. An individual with a secure attachment style has internalized a comforting relation with a caregiver, and can adequately regulate his or her emotions in moments of distress. Compared to the general population, attachment insecurity has a higher prevalence in samples of eating disorders patients—regardless of diagnostic subgroup: anorexia nervosa (AN), bulimia nervosa (BN) or binge-eating disorder (BED) [6–12]. Attachment insecurity relates to severity of eating disorder symptoms [13] and treatment outcome [13, 14].

With regard to insecure attachment, Hesse and Main [15, 16] distinguished three different internalized patterns: ambivalent-preoccupied (sensitive to separation, overwhelmed by emotions in moments of distress, seeking but not easily finding comfort by others); avoidant-dismissive (valuing independence from others; tendency to downplay emotions, not seeking comfort by others when in distress); and disorganized-unresolved (no coherent strategy to deal with interpersonal distress, moments of disintegration and dissociation, affective dysregulation). An insecure attachment style renders individuals prone to difficulties in interpersonal relations while at the same time inhibiting them to handle subsequent emotions adequately [17].

Attachment insecurity is directly related to body dissatisfaction in eating disorder samples [18–20]. Redirecting attention from interpersonal discomfort to concrete goals with respect to weight and appearance can be understood as an attachment–avoidant way of problem solving [21]. The association between fearful and dismissive attachment styles and preoccupation with weight and appearance is also found in orthorexia nervosa, a condition which is characterized by an obsession with proper nutrition and restrictive eating patterns [22]. Factors that mediate between attachment insecurity and symptoms in eating disorder patients are under-regulation of emotions [23, 24], depression and feelings of ineffectiveness [19], maladaptive perfectionism [25] and alexithymia [26]. For several psychiatric disorders, including eating disorders, attachment security before treatment is associated with the outcome of intensive treatment [27]. This finding was not replicated in a study on the outcome of group psychotherapy in women with BED: the significant reduction of binge-eating frequency post-treatment was not related to pre-treatment attachment security [28]. In this present study, the hypothesis that recovery from AN, BN or eating disorder not otherwise specified (EDNOS) may be related to pre-treatment attachment status and/or to improvement of attachment security after a period of treatment was investigated. Carter et al. [29] found that 41% of recovered AN patients relapsed into an eating disorder within 1 year after the end of inpatient/day treatment. Therefore, we also investigated the relation between attachment security and persistence of recovery.

Attachment security is not only associated with adequate emotion regulation but also with good mentalizing skills [30]. Mentalization is the capacity to understand human behaviour in terms of intentional, mental states such as personal desires, needs, feelings, expectations or beliefs [31]. Compared to healthy controls, mentalization is low in AN patients [32–34], and in a subgroup of BN patients [35]. High mentalization is characterized by a reflective and integrative way of understanding experiences, low mentalization by difficulties in distinguishing inner states from external experiences and by a dissociation between thoughts and fantasies and external reality [31]. Low mentalization could play a mediating role between attachment insecurity and eating disorder symptoms [36]. Negative affects that are experienced in bodily instead of mental terms are dealt with in physical ways such as binging and purging, restraining and losing weight. Better mentalization, in combination with more benevolent parental representations, is related to lower levels of eating disorder symptoms in a sample of eating disorder patients; this relation is mediated by anxiety and depression [37]. Recovery from AN is associated with improvement in theory of mind skills [38]. It is not yet clear whether pre-treatment level of mentalization influences the outcome of treatment in AN, BN or EDNOS. For personality disorders, limited evidence suggests that good mentalization accelerates the process of profiting from treatment [39]. Most studies on attachment security and mentalization in AN and BN sofar have been cross sectional. As a result, not much is known about their role in the longitudinal course of these eating disorders. In a longitudinal study on BED, mentalization improved in 1 year of group psychotherapy in women with BED; a higher level of pre-treatment mentalization was associated with greater reduction of binge-eating symptoms [28]. Given the cross-sectional links found between mentalization and AN or BN, one could argue that mentalization is also related to various stages of recovery from these eating disorders. Therefore, mentalization was included in this study as a factor to investigate in relation to recovery.

In studying attachment and mentalization in eating disorders, it is important to assess those co-morbid conditions which are known to be associated both with attachment insecurity [40] as well as eating disorders such as anxiety disorders, personality disorders, self-injurious behaviour [41–43]. Improvement of attachment security and mentalization occurring in treatment has been found in borderline personality disorder patients [44] and in self-injuring adolescents [45].

In the present study, we investigated the changes in attachment security and mentalization and symptoms in a group of AN and BN patients over time; in particular, whether recovery status 1 year after the start of the

treatment (i.e. not recovered, recovered) and 18 months after the start of the treatment (i.e. persistently ill, relapsed, newly recovered, persistently recovered) was related to attachment security and level of mentalization. Besides measuring relevant co-morbidity, we assessed psycho-neuroticism [46, 47] and autonomy [48] because of their established relations to both eating disorder symptoms and to attachment security.

This study is part of a larger comprehensive study. In the first cross-sectional part, AN and BN patients were compared to healthy controls [33]. In the second longitudinal part, the patient group was followed from the start of treatment (T0) to 1 year afterwards (T1) and the relations between changes in symptoms and changes in attachment and mentalization in 1 year were investigated. In this third part of the study, patients were followed from the start of treatment to an 18 months' follow-up (T2) to investigate whether higher attachment security and mentalization were associated with recovery and protected against relapse in the period after the end of intensive treatment. Recovery was defined as no longer fulfilling the criteria for an eating disorder diagnosis according to the structured clinical interview for DSM axis I disorders (SCID-I). Intensive (inpatient or day hospital) treatment in our study had a duration of 6–8 months, followed by outpatient treatment. Thus, the follow-up period of 12 months and 18 months after the start of treatment included the timespan with the highest risk for relapse: 4–9 months after the end of intensive treatment [29].

## Objective

1. To investigate any pre-existent differences in attachment, mentalization, duration of illness, age and core or co-morbid symptoms among recovery status groups.
2. To investigate whether recovered patients were more securely attached and had higher levels of mentalization than patients who had not recovered, 1 year after the start of treatment.
3. To compare recovered and unrecovered patients 1 year after the start of treatment on core and co-morbid symptoms. We expected that recovered patients suffered less from depression, personality disorders, anxiety, psycho-neuroticism, autonomy problems and self-injurious behaviour than unrecovered patients.
4. To investigate whether the effect of attachment and mentalization on 1-year recovery persisted six months later, at an 18 months' follow-up. Our expectation was that patients who persisted in recovery at 18 months' follow-up were more securely attached and had higher mentalization scores 1 year after the start of treatment than patients who relapsed or still had an eating disorder.

## Methods

This study has been approved by the Netherlands Medical Ethical Committee for Mental Health Institutions (Medisch-Ethische Toetsingscommissie Instellingen Geestelijke Gezondheidszorg, METIGG).

### Participants

Participants were eating disorder patients who were starting a (daytime) clinical treatment program at one of the two selected eating disorder treatment centres in the south part of the Netherlands. In both centres, in accordance with the evidence-based Dutch multidisciplinary guidelines [49], patients were treated in a group treatment program, for 4–5 days a week. The treatment consisted of psychotherapy, meals, sociotherapy, art therapy and psychomotor therapy. Attendance of all modules in the treatment program was obligatory. In addition to group treatment, each patient had weekly individual psychotherapy sessions. The aims of treatment were to normalize eating behaviour and weight; to enhance mentalization and autonomy; to improve the recognition, expression and regulation of emotions; to improve body awareness and body satisfaction; and to improve social skills, peer group and family relations. If needed, pharmacotherapy or EMDR was provided. Treatment groups were open and changed constantly over time, because patients joined and left the program on a regular basis, moving on to different phases (start of treatment, consolidation phase, outpatient treatment). All patients of at least 18 years old, who started treatment, were asked to participate; in a period of two and a half years, 50 patients were included in the study.

The sample size was based on the following considerations. Based on a study on the effect of 1 year of psychotherapy on attachment and mentalization in borderline personality disorder patients [44], we expected large effect sizes for changes in Adult Attachment Interview (AAI) classifications and Reflective Functioning Scale scores (RFS) after 1 year of treatment. Using G*power [50], we computed the minimal sample sizes required to obtain a power of 0.80, given an nominal Type I error rate of 0.05 and a large effect size. For McNemar's test, using Cramer's $V = 0.05$ for a large effect size, the minimally required sample size equals 32. For a one-sided dependent sample $t$ test, using Cohen's $d = 0.8$ for a large effect size, the minimally required sample size equals 27. Expected dropout ranges between 20 and 50% [51]. Hence, starting out with $N = 50$ would allow 36% attrition to obtain the minimum value of $N = 32$.

Between T0 and T1 12 of the 50 (all female) participants dropped out (24%); 38 participated at all three moments of

assessment T0, T1 and T2 (completers). The majority of the patients ($N = 46$ at T0, dropouts $N = 10$) came from one treatment centre, and four (dropout $N = 2$) from the other participating centre. The 38 completers had a mean age of 22.2 years (SD 3.5) at the start of treatment, 20 of them had an education at college/university level, and the other 18 had a lower level of education. 71% of the completers had AN at the start of treatment, 10.5% had BN, and 18.5% suffered from AN or BN but did not completely meet the DSM-IV criteria (further referred to as EDNOS). At T0, the mean scores on eating disorder symptoms drive for thinness (DT), bulimia (B) and body dissatisfaction (BD) were high compared to the mean scores in a norm group of restrictive AN patients with mean body mass index (BMI) = 15 [52]; in our sample, mean BMI at T0 was higher ($M = 17.23$, SD = 2.66). Most patients ($N = 35$) were still receiving treatment at T1; for $N = 22$ this was outpatient eating disorder treatment, for $N = 10$ this was outpatient treatment for an anxiety disorder or personality disorder, and for $N = 3$ this was readmission in [daytime] hospital treatment because of a relapse ($N = 3$). No specific treatment information was attained at T2. The dropouts were older ($M = 28.7$ years, SD = 11.4) than completers; $t(48) = -3.16$, $p = 0.003$; $d = 0.77$. There were no differences between the two groups regarding level of education, the severity of eating disorder symptoms, the duration of illness, attachment security, mentalization, depression, anxiety, psycho-neuroticism or autonomy, personality disorders and self-injurious behaviour.

## Procedure

The first assessment of symptoms was performed at the start of treatment (T0). 1 year later (T1), the participants were invited to the second assessment. Both at T0 and T1, patients were screened for psychotic symptoms, using the section on psychotic symptoms of the mini-international neuropsychiatric interview (MINI) [53]. Only patients without psychotic symptoms were included in the study. Both the SCID-I [54] and the structured clinical interview for DSM axis II disorders (SCID-II) [55] were conducted.

To classify the state of mind with regard to attachment, the AAI [56] in Dutch translation [57] was held with each patient. The RFS [30] was used for assessing the level of mentalization on the verbatim text of the AAI. To measure the severity of eating disorder and co-morbid symptoms, the participants completed five self-report questionnaires, providing scores on eating disorder symptoms, state and trait anxiety, psycho-neuroticism, three aspects of autonomy, and self-injurious behaviour. All instruments are described below.

At T0, patients were interviewed in the first 2 weeks of their (daytime) clinical treatment. The completed questionnaires were returned before the end of the 3rd week. At T1, the same interviews and questionnaires were conducted. 6 months later- 18 months after the start of treatment -(T2) the SCID-I section eating disorders was conducted, either face to face or by telephone. At the same moment patients were invited to complete the questionnaire on eating disorder symptoms that was used on T0 and T1. One patient did not return this questionnaire, counting as missing in the analysis of the T2 results.

Recovery status at T1 had two levels: recovered (i.e. no longer fulfilling the criteria for an eating disorder diagnosis according to the SCID-I) and unrecovered (i.e. fulfilling the SCID-I criteria for an eating disorder). At T2, recovery status had four levels: persistently recovered (i.e. recovered both at T1 and T2), newly recovered (i.e. recovered between T1 and T2), persistently ill (i.e. suffering from an eating disorder both at T1 and T2), and relapsed (recovered at T1, ill at T2).

## Measures

We provide a brief overview of the measurement instruments. For a more detailed description of the instruments used in this study, including the psychometric properties, we refer to Kuipers et al. [33]. Estimates of the reliability at T2 have not been reported earlier and are mentioned here. The sections on eating and on mood disorders of the SCID-I were used to diagnose eating disorders and depression, respectively; the SCID-II was used to diagnose personality disorders. The eating disorder inventory-II (EDI-II) [58] in Dutch translation [52], short version, was used to measure eating disorder symptoms. The total score on the EDI-II short version was taken as a measure for the severity of eating disorder symptoms. Cronbach's alpha for the total EDI score at T2 was equal to 0.88. The subscales drive for thinness, bulimia and body dissatisfaction were taken as measures for the severity of the respective eating disorder symptoms. The State trait anxiety inventory (STAI) [59] in Dutch translation [60] was used to assess state anxiety and trait anxiety which refer to the level of anxiety and proneness to anxiety, respectively. The total score on the Dutch version of the symptom checklist-90 (SCL-90) [61]; Dutch version [62] was used to measure psychoneurotic-somatic distress. The Dutch version of the autonomy-connectedness scale-30 (ACS-30) [63] was used to measure three aspects of autonomy: self-awareness, sensitivity to others, and capacity to manage new situations. We used the self-injury questionnaire-treatment related (SIQ-TR) [64] to assess the prevalence and frequency of six types of self-injurious behaviour: scratching, cutting, bruising, burning, biting oneself, and any other form of self-injury. Self-injurious behaviour was considered to be present if it had occurred at least one time in the previous month. In a study

on the reliability and validity of the SIQ-TR in a sample of female eating disorder patients, SIQ-TR outcomes significantly correlated to outcomes on the self-harm inventory [64].

The AAI was used to assess attachment security and level of mentalization. First, the AAI was used to classify respondents with respect to attachment. Classification F (free) is secure; insecure classifications are Ds (dismissive), E (entangled), CC (cannot classify) and U (unresolved for loss or abuse). The coherence of mind subscale of the AAI (COH) [65] was taken as a quantitative measure of the level of attachment security. The 9-point scale ranges from 1 to 9; a higher score indicates more security. Most studies using the AAI report outcomes on attachment in categorical terms; studies reporting the relation between COH and measures for psychopathology [28, 66] are scarce. In our study, den Hollander (trained by D. Pederson and D. Jacobvitz, and reliable since 2001) classified the patients on attachment, and scored the COH. Ten of the AAI interviews were also classified by Kuipers (trained by D. Pederson and D. Pederson, reliable since 2011); interrater reliability can be qualified as good: Cohen's $\kappa = 0.75$ for classifying F, Ds, E, and CC, and 0.74 for classifying U; interrater correlation between scores on COH $r = 0.86$. Second, the AAI was used to score respondents on the RFS, a quantitative measure of mentalization. The 11-point scale ranges from −1 (negative), 1 (absent) to 3 (low), 5 (ordinary), 7 (marked) and 9 (excellent). G. Kuipers (trained at the Anna Freud Center in 2011, and reliable since 2012) scored the RFS.

### Statistical analyses

We conducted statistical analysis in four steps. First, in a preliminary analysis, dropouts and completers were compared in terms of eating disorder, attachment, mentalization, personality disorder, self-injurious behaviour, depression, anxiety, psycho-neuroticism and autonomy. In this step, we used 15 statistical tests.

Second, the prevalence of cluster A, cluster B and cluster C personality disorders as well as the prevalence of self-injurious behaviour at T0 were investigated for recovered and unrecovered patients, and differences in prevalence between the groups were tested using a Chi square test for proportions. Differences in mean age, mean duration of illness, and mean scores on the COH, the RFS, the EDI-II, STAI, SCL-90 and ACS-30 at T0 between recovered and unrecovered patients were tested using a one-sided *t* test for independent samples. In total, we conducted 19 tests in the second step.

Third, recovered patients were compared with unrecovered patients on the prevalence of cluster A, cluster B and cluster C personality disorders, and of self-injurious behaviour at T1, using Chi square tests for proportions. Mean scores on the COH, the RFS, the EDI-II, STAI, SCL-90 and ACS-30 at T1 of recovered and unrecovered patients were tested using a one-sided *t* test for independent samples. In total, we conducted 17 tests in the third step.

Fourth, we analysed the prevalence of eating disorder diagnoses at T2. Differences among the four levels of recovery status concerning mean scores on COH and RFS, both at T1 and T0, were investigated by analysis of variance (ANOVA). In total, we conducted four tests in this step. Differences between the changes in the mean total EDI score over time for the four subgroups were analysed with a one-within, one-between subjects ANOVA, with time as within-subjects variable and group as between-subjects variable. Post hoc, the differences in between EDI for each time point separately were assessed using an ANOVA with adjusted Type I error rate.

Data were analysed using PASW (SPSS), version 19 [67]. In significant testing, we used the nominal Type I error rate of alpha = 0.05. Because we conducted multiple tests in this study, we used the Benjamini–Hochberg procedure [68, 69] to control the family wise Type I error rate within each step. The Benjamini-Hochberg procedure is more powerful than the Bonferroni correction, while still correcting for multiple testing. Following this procedure, each single test had a different alpha level. Significant results will be marked with an asterisk (*). We used Cohen's *d* as the effect size for the difference of two means (0.2 is small, 0.5 is medium, 0.8 is large) [70] and the φ (phi) coefficient as the effect size for association (0.1 is small, 0.3 is medium, 0.5 is large) [70].

## Results

### Eating disorder diagnosis: recovery and relapse

1 year after the start of treatment (T1), 11 of the 38 patients no longer met the DSM-IV-TR criteria for an eating disorder (28.4%); at the 18 months' follow-up (T2) the number of recovered patients was 14 (36.8%) as is shown in Table 1. Two of the recovered patients at T1 relapsed at T2; five patients who had an eating disorder at T1 had recovered at T2.

**Table 1** Numbers of patients who recovered from an eating disorder at T1 and T2

| | Recovered | Not recovered/relapsed |
|---|---|---|
| T1 | 11 | 27 |
| T2 | 14 | 24 |

**Table 2** Turnover of eating disorder into recovery or another eating disorder, in the patient group from start of treatment (T0) to the 18 months' follow-up (T2)

| | T2 | | | | | Total T0 |
|---|---|---|---|---|---|---|
| | ANR | ANBP | BN | EDNOS | Rec | |
| T0 | | | | | | |
| ANR | 7 | 0 | 0 | 3 | 5 | 15 |
| ANBP | 2 | 3 | 0 | 5 | 3 | 13 |
| BN | 0 | 0 | 1 | 0 | 3 | 4 |
| EDNOS | 0 | 0 | 1 | 2 | 3 | 6 |
| Total T2 | 9 | 3 | 2 | 10 | 14 | 38 |

*ANR* anorexia nervosa, restrictive type; *ANBP* anorexia nervosa, bingeing-purging type; *BN* bulimia nervosa; *EDNOS* eating disorder not otherwise specified; *Rec* recovered from eating disorder

Per diagnostic subgroup at the start of treatment (T0) recovery percentages at the 18 months' follow-up were 23.0% for patients with AN, bingeing-purging type, 33.3% for patients with AN, restrictive type, 50.0% for patients with an eating disorder not otherwise specified, and 75% for patients who had BN. Table 2 shows the turnover from eating disorder diagnoses between the start of treatment and the 18 months' follow-up.

## Pre-treatment differences between recovered and unrecovered patients

At T0, the mean scores of recovered and unrecovered patients (T1) did not differ significantly with regard to the severity of eating disorder or co-morbid symptoms, duration of illness, or age (Table 3) neither were there differences in attachment security or mentalization. The differences with large effect sizes between the two groups on RFS score [$t(36) = 2.60$, $p = 0.013$; $d = 0.83$] and on sensitivity to others [$t(36) = 2.45$, $p = 0.019$; $d = 0.94$] did not reach statistical significance due to the correction for multiple testing.

## Attachment security and mentalization of recovered and unrecovered patients

Our hypothesis that recovered eating disorder patients would be more securely attached than unrecovered patients 1 year after the start of treatment was not confirmed: at T1 no differences were found, neither in the distribution of secure AAI classification F (not tabulated) nor in the mean score on the AAI subscale COH (see Table 4). As hypothesized, we found a large effect of recovery status at T1 on mentalization: At T1, the mean RFS score was higher for recovered patients ($M = 3.73$, SD = 1.42) than for unrecovered patients ($M = 2.52$, SD = 1.42); $t(36) = 2.37$, $p = 0.023$*; $d = 0.85$).

## Comparing recovered and unrecovered patients on core and co-morbid symptoms 1 year after the start of treatment

We expected that recovered eating disorder patients suffered less from eating disorder symptoms, depression, personality disorders, anxiety, psycho-neuroticism, autonomy problems than unrecovered patients and that the prevalence of self-injurious behaviour would be lower in the group of recovered patients than in the group of unrecovered patients. With the exception of bulimic symptoms and two aspects of autonomy—the capacity to manage new situations and self-awareness—this hypothesis was confirmed (see Table 4).

A remarkable change took place for the recovered patients compared to the unrecovered patients with regard to the sensitivity to others, the third aspect of autonomy that was assessed: At the start of treatment, patients who would recover scored higher on Sensitivity to others; 1 year later their mean score on this subscale was significantly lower compared to unrecovered patients; $t(36) = 2.31$, $p = 0.027$*; $d = 0.78$ (see Table 4). Analysing the changes on the other two aspects of autonomy, we found the change on the capacity to manage new situations subscale (delta CMNS) in 1 year also bigger for the recovered patients ($M = 0.074$, SD = 0.692) than for patients who had not recovered [$M = -0.561$, SD = 0.388; $t(36) = -2.85$, $p = 0.007$*].

## Follow-up at 18 months

### *Eating disorder symptoms*

Table 5 shows the mean scores on the EDI for the recovery status subgroups at the start of treatment, 1 year afterwards and at 18 months. Figure 1 shows the same results graphically. The changes in mean EDI score over time differed significantly between groups [$F(6,64) = 5.419$, $p < 0.001$*]. Both on T1 as on T2 the EDI scores of the persistently recovered patients differed significantly from the scores of the patients who had an eating disorder [$F(3,34) = 8.432$, $p < 0.001$; $F(3,33) = 5.619$, $p < 0.005$*].

### *Relation of symptoms to attachment and mentalization*

Contrary to our expectation persistently recovered patients ($N = 9$) did not score higher on attachment security and mentalization six months earlier (T1) than patients who relapsed ($N = 2$) or persisted into an eating disorder ($N = 22$). The persistently recovered and the persistently ill eating disorder patients differed in mean RFS score at the start of treatment [$F(3,34) = 3.483$, $p = 0.026$*].

**Table 3** Pre-treatment (T0) scores on attachment security, mentalization, age, eating disorder and co-morbid symptoms of patients who recovered one year later (T1) compared to unrecovered patients

| Measure | Rec ($N = 11$) | | Unrec ($N = 27$) | | Stat. analysis | | Effect size Cohen's $d$ | Alpha |
|---|---|---|---|---|---|---|---|---|
| | $M$ | SD | $M$ | SD | $t(36)$ | $P$ | | |
| RFS | 3.64 | (1.91) | 2.33 | (1.14) | 2.60 | 0.013 | −0.83 | 0.002 |
| Sensitivity to others | 4.39 | (0.28) | 4.06 | (0.41) | 2.45 | 0.019 | −0.94 | 0.005 |
| SCL-90 | 218.45 | (51.98) | 250.81 | (47.95) | 1.84 | 0.074 | 0.64 | 0.008 |
| State anxiety | 54.73 | (10.16) | 60.59 | (11.17) | 1.51 | 0.141 | 0.54 | 0.011 |
| Coherence | 4.36 | (2.38) | 3.30 | (2.36) | 1.26 | 0.216 | −0.44 | 0.013 |
| Duration of illness (years) | 5.14 | (2.85) | 4.95 | (3.42) | 0.164 | 0.249 | −0.06 | 0.016 |
| EDI total | 260.36 | (22.61) | 269.26 | (25.35) | 1.01 | 0.319 | 0.37 | 0.018 |
| Depression | 1.27 | (1.27) | 1.70 | (1.30) | 0.935 | 0.356 | 0.33 | 0.021 |
| Capacity to manage new solutions | 1.97 | (0.71) | 2.22 | (0.80) | 0.890 | 0.379 | 0.33 | 0.024 |
| Body dissatisfaction | 46.09 | (7.47) | 47.19 | (7.19) | 0.421 | 0.676 | 0.15 | 0.026 |
| Trait anxiety | 62.27 | (7.50) | 63.41 | (8.45) | 0.387 | 0.701 | 0.14 | 0.029 |
| Drive to thinness | 35.09 | (4.99) | 35.59 | (5.70) | 0.254 | 0.801 | 0.09 | 0.032 |
| Self-awareness | 2.39 | (0.70) | 2.44 | (0.97) | 0.154 | 0.879 | 0.06 | 0.034 |
| Bulimia | 17.48 | (8.50) | 17.64 | (9.60) | 0.049 | 0.961 | 0.02 | 0.017 |
| Age (years) | 22.36 | (3.23) | 22.07 | (3.58) | 0.232 | 0.818 | 0.08 | 0.040 |

| | Rec ($N = 11$) | Unrec ($N = 27$) | Stat. analysis | | Effect size $\Phi$ | Alpha |
|---|---|---|---|---|---|---|
| | Proportion | Proportion | $\chi$ [1] | $P$ | | |
| PD cluster A | 0.46 | 0.48 | 0.87 | 0.648 | 0.15 | 0.042 |
| PD cluster B | 0.64 | 0.70 | 0.16 | 0.685 | 0.07 | 0.045 |
| PD cluster C | 0.91 | 0.89 | 0.03 | 0.854 | 0.03 | 0.047 |
| Self-injurious behaviour | 0.18 | 0.33 | 0.87 | 0.35 | 0.15 | 0.050 |

*RFS* reflective functioning scale, *Sensitivity to Others* autonomy-connectedness scale-30 subscale, *SCL-90* symptom checklist-90, *State Anxiety* state trait anxiety inventory subscale, *Coherence* AAI coherence of mind subscale, *Duration of Illness* duration of eating disorder prior to start of treatment, *EDI* eating disorder inventory-II, *Depression* SCID-I depression severity [0 = none, 1 = mild, 2 = moderate, 3 = severe], *Capacity to Manage New Situations* autonomy-connectedness scale-30 subscale, *Body dissatisfaction* EDI-II subscale, *Trait Anxiety* state trait anxiety inventory subscale, *Drive for thinness* EDI-II subscale, *Self-Awareness* autonomy-connectedness scale-30 subscale, *Bulimia* EDI-II subscale, *Age* age at the start of treatment, *PD* personality disorder, *Recovered* no longer suffering from eating disorder at T1, *Not rec* still suffering from eating disorder at T1, *Stat. Analysis* statistical analysis, $M$ = mean, $SD$ = standard deviation, $t(36)$ realization of independent $T$-test with 36 degrees of freedom, $\chi(1)$ chi square test, *Alpha* type I error rate alpha corrected for multiple testing following Benjamini-Hochberg procedure

Regarding the relation of core and co-morbid symptoms with recovery or persistent illness at 18 months follow-up: a higher T1 mean score on the EDI [$F(3,34) = 8.43$, $p = 0.000$*], on drive for thinness [$F(3,34) = 9.22$, $p = 0.000$*], on the SCL-90 [$F(3,34) = 9.24$, $p = 0.000$*], state anxiety [$F(3,34) = 4.72$, $p = 0.007$*] and trait anxiety [$F(3,34) = 6.84$, $p = 0.001$*] and the presence of a personality disorder on T1 [$\chi^2(1) = 7.66$, $p = 0.006$*] were related to persistence of eating disorder on T2.

## Discussion

We investigated whether recovery from an eating disorder is related to attachment security and mentalization, with the result that recovered patients scored higher on mentalization than unrecovered patients. This study's percentage of 36.8% recovery 18 months after the start of treatment is similar to the 40% remission rate that Fittig et al. [71] found in a mixed sample of AN and BN patients 18 months after ending day-hospital treatment. The number of relapsed patients in our study was too small to effectively investigate our hypothesis on relapse in relation to attachment security and mentalization.

The relation between AAI attachment classifications and treatment outcome that was found for various axis I and II disorders (including eating disorders) [27], and for self-report measurement of attachment in eating disorders [13] was not confirmed in our study. COH showed a moderate effect in favour of the recovered patients compared to the unrecovered patients, both before and after 1 year of treatment. These effects did not reach statistical significance, possibly because of a lack of power due to a small sample size. Our use of the AAI instead of self-report could

**Table 4** T1 scores on attachment security, mentalization, eating disorder and co-morbid symptoms of recovered and unrecovered eating disorder patients, 1 year after the start of treatment

| Measure | Recov ($N = 11$) | | Not Rec ($N = 27$) | | Stat. analysis | | Effect size Cohen's $d$ |
|---|---|---|---|---|---|---|---|
| | $M$ | SD | $M$ | SD | $t$ [36] | $p$ | |
| SCL-90 | 149.82 | (35.35) | 232.42 | (45.16) | 5.41 | 0.000* | 2.06 |
| Drive for thinness | 21.00 | (8.60) | 34.63 | (6.43) | 5.37 | 0.000* | 1.79 |
| EDI total | 192.00 | (45.58) | 260.22 | (33.17) | 5.15 | 0.000* | 1.71 |
| Trait anxiety | 46.27 | (9.83) | 61.52 | (9.39) | 4.48 | 0.000* | 1.59 |
| State anxiety | 43.45 | (8.45) | 57.96 | (11.56) | 3.76 | 0.001* | 1.43 |
| Depression | 0.18 | (0.60) | 1.21 | (1.19) | 2.61 | 0.013* | 1.09 |
| Body dissatisfaction | 34.91 | (13.66) | 44.30 | (8.66) | 2.55 | 0.015* | 0.82 |
| RFS | 3.73 | (1.42) | 2.52 | (1.42) | 2.37 | 0.023* | −0.85 |
| Sensitivity to others | 3.83 | (0.55) | 4.21 | (0.42) | 2.31 | 0.027* | 0.78 |
| Bulimia | 11.36 | (5.41) | 16.11 | (7.33) | 1.94 | 0.060 | 0.74 |
| COH | 5.32 | (2.03) | 4.11 | (2.27) | 1.53 | 0.135 | −0.56 |
| Capacity to manage new situations | 2.53 | (0.78) | 2.14 | (0.96) | 1.19 | 0.240 | −0.44 |
| Self-awareness | 2.85 | (0.83) | 2.47 | (0.98) | 1.12 | 0.270 | −0.41 |

| | Rec ($N = 11$) Proportion | Unrec ($N = 27$) Proportion | Stat. analysis $\chi$ (1) $p$ | Effect size $\Phi$ |
|---|---|---|---|---|
| PD cluster B | 0.00 | 0.59 | 0.001* | 0.54 |
| PD cluster C | 0.64 | 0.96 | 0.007* | 0.44 |
| PD cluster A | 0.00 | 0.33 | 0.028* | 0.36 |
| Self-injurious behaviour | 0.09 | 0.44 | 0.037* | 0.34 |

*SCL-90* symptom checklist-90, *EDI* eating disorder inventory-II, *Drive for Thinness* EDI subscale, *Trait Anxiety* state trait anxiety inventory subscale, *State Anxiety* state trait anxiety inventory subscale, *Depression* SCID-I depression severity [0 = none, 1 = mild, 2 = moderate, 3 = severe], *Body Diss* EDI subscale body dissatisfaction, *RFS* reflective functioning scale, *Sensitivity to Others* autonomy-connectedness scale-30 subscale, *Bulimia* EDI subscale, *Coherence* AAI coherence of mind subscale, *Capacity to Manage New Situations* autonomy-connectedness scale-30 subscale, *Self-Awareness* autonomy-connectedness scale-30 subscale, *Rec* no longer suffering from eating disorder at T1, *Unrec* still suffering from eating disorder at T1, *Stat. Analysis* statistical analysis, *M* mean, *SD* standard deviation, $t(36)$ realization of independent *T*-test with 36 degrees of freedom, *PD* personality disorder, $\chi(1)$ chi square test

* Significant following the Benjamini-Hochberg method [with $\alpha = 0.05$] to account for multiple hypothesis testing

**Table 5** Mean EDI-2 total scores on T0, T1 and T2 for subgroups of patients who recovered, relapsed or had eating disorder at T2

| T2 | EDI T0 | | EDI T1 | | EDI T2 | |
|---|---|---|---|---|---|---|
| | $M$ | SD | $M$ | SD | $M$ | SD |
| Persistent recovery $N = 9$ | 261.89 | (24.84) | 190.67** | (50.83) | 178.11* | (44.34) |
| New recovery $N = 5$ | 272.20 | (11.03) | 264.60** | (32.51) | 218.60 | (41.63) |
| Persistent illness $N = 21$ | 268.59 | (27.74) | 259.23** | (33.99) | 245.05* | (40.05) |
| Relapse $N = 2$ | 253.50 | (7.78) | 198.00 | (4.24) | 227.50 | (16.26) |

*EDI* eating disorder inventory, *M* mean, *SD* standard deviation

Statistical significant difference between different groups at the same time, in one-between subjects ANOVA test: * $p < 0.005$, ** $p < 0.001$

also explain the difference with self-report studies' findings [13]; correlations between AAI subscales with specific self-report measures of attachment range from low to moderate, COH having the highest association with self-report [72]. Our study's result is in line with the finding that treatment outcome in women with BED is not associated with attachment security [28]. Possibly treatment outcome in eating disorders is not associated with overall pre-treatment attachment security, but with specific aspects of attachment. E.g. higher attachment anxiety and a higher need for approval pre-treatment in women with eating disorders predicted poorer treatment outcome [13].

In line with our expectation, a higher level of mentalization was related to recovery 1 year after the start of treatment. At the start of treatment, this difference in mentalization between patients that would recover and

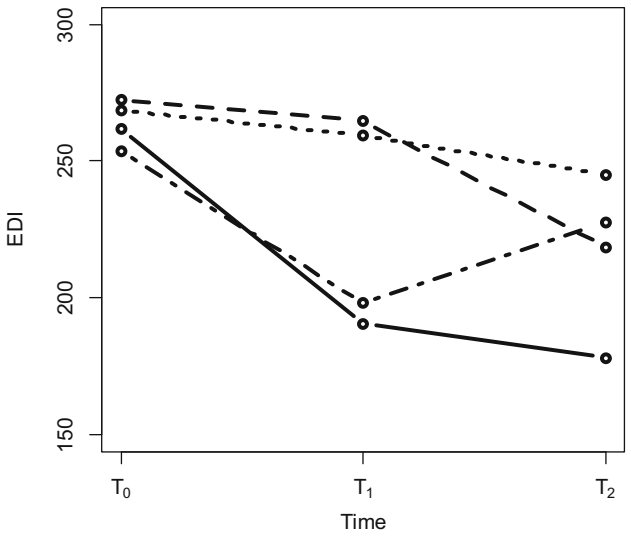


**Fig. 1** Mean EDI-2 total scores on *T0*, *T1* and *T2* of persistently recovered (*solid*), relapsed (*dashed dotted*), persistently ill (*dotted*) and newly recovered (*dashed*). *EDI* mean total score on eating disorder inventory-2; *Dashed* new recovery: eating disorder diagnosis at T0 and T1, recovery at T2; *Dotted* persistent illness: eating disorder diagnosis at T0, T1 and T2; *Solid* persistent recovery: eating disorder diagnosis at T0, recovery on T1 and T2; *Dashed dotted* relapse: eating disorder diagnosis on T0 and T2, recovery on T1

patients that would stay ill was already apparent; though the effect size was large, due to multiple testing and its consequence for statistical analysis the effect did not reach significance. Better treatment outcome of group psychotherapy for women with BED was also related a higher level of pre-treatment mentalization [28]. In a study on personality disorders, the positive influence of mentalization found in the initial phase of treatment disappeared over time [39]. Thus, the question remains if mentalizing skills influence the course of eating disorders in the longer run. The sample size in our study was too small to effectively investigate the relations between mentalizing, persistent recovery and relapse in eating disorders. Besides larger numbers of patients, repeated measures over a longer period are required to investigate these relations. Mentalization is a multifaceted, dynamic process that is influenced by constitutional factors as well as interpersonal distress and life events [73]. Future investigation on mentalization and course of eating disorders should measure different aspects of mentalization, for example, self-oriented versus other-oriented. Recognizing others' mental states can improve in recovered AN patients to the level of healthy controls, but the difficulty to recognize their own emotions remains even if they recover [38]. In women with BED post-treatment reflective functioning scores, though higher than pre-treatment, indicated that on average difficulties with mentalization were still present [28]. Because of its explicit focus on enhancing mentalizing skills and its proven effectiveness in reduction of symptoms in borderline personality disorder (BPD) patients, mentalization-based treatment (MBT) could be useful in treating eating disorders. Due to high dropout rates, the results of a randomized controlled trial comparing MBT to specialist supportive clinical management in eating disorder patients with co-morbid BPD were hard to interpret [74]. In a preliminary trial MBT was not more effective than individual psychodynamic psychotherapy in reducing symptoms in patients with anorexia nervosa; however, the small sample size in this study asks for caution in drawing conclusions [75]. Further study is needed.

The improvement we found in terms of co-morbidity in the recovered eating disorder patients is in line with other studies on recovered patients: significant decrease in personality disorders [42], in anxiety [76], in psycho-neuroticism [71], in depression [77]. The frequency of self-injurious behaviour was more frequent and more persistent in patients who did not recover; self-injurious behaviour is associated with a negative treatment outcome [45]. Severity of co-morbidity before treatment was not related to recovery at 1 year in our study. But co-morbidity was associated with persistence of illness from 12 to 18 months follow-up. In other studies, personality disorders, anxiety and depression negatively related to outcome in eating disorders [78]; Fichter et al. [79] suspected co-morbidity indirectly influenced the outcome by extending the duration of clinical treatment, which was found to relate to a negative outcome. Other factors known to influence the outcome: age and duration of illness before treatment [78], did not differ in our study, possibly due to the small sample size.

A remarkable change occurred with respect to autonomy in patients who recovered. Before treatment, they were more sensitive to others than those patients who did not recover in 1 year's time, but after 1 year they were comparatively less sensitive to others. Sensitivity to others is defined as sensitivity to opinions, wishes and needs of other people; empathy; and capacity and need for intimacy and separation. Females score higher on this ACS-30 subscale than men [80]; eating disorder patients score higher than healthy controls [33]. In our study, patients who recovered also changed significantly more on another aspect of autonomy: the capacity to manage new situations. These results suggest that the recovered patients profited from treatment by gaining autonomy. In a study on interpersonal problems in AN and BN patients, Hartmann et al. [81] found their pre-treatment non-assertive, submissive interpersonal style changed to more autonomy after months of intensive treatment. Autonomy problems in eating disorders were found to relate to attachment insecurity [48]. Eating disorders typically develop in adolescence, in which the task of separation-individuation from primary

caregivers and the development to become an autonomous adult needs to be fulfilled. This task is more likely to succeed in securely attached teenagers because they have more adequate emotion-regulating skills and can rely on the support of their caregivers [82]. The current model on eating disorders takes developmental (e.g. attachment experiences, adverse life events), constitutional (e.g. genetic vulnerability, personality traits) and socio-cultural (e.g. gender role expectations) factors in account, to explain why some—in particular female—adolescents in the context of insecurity and social comparison are prone to disordered eating. A poorly developed self and a tendency to negative self-evaluation are central features in this process, embodied as body dissatisfaction and a drive for thinness [24, 25, 83].

Some studies on attachment in eating disorders underscore the intergenerational aspect [8, 10, 84]: the majority of mothers of eating disorder patients in these studies were insecurely attached, mostly due to disorientation with regard to loss or abuse. A disoriented attachment style in parents highly relates to psychopathology in their children [85]. Theoretically, eating disorders symptoms in daughters of insecurely attached mothers could be partly mediated by daughters' high sensitivity to others.

Our study is the first longitudinal study on the relations of attachment and mentalization, assessed with the AAI, with recovery from AN and BN. A limitation of this study has been the small sample size which reduced the power of statistical testing and has made regression analysis on the contribution of different variables to recovery from an eating disorder impossible. Another limitation has been the short-term follow-up, due to restricted means in terms of time and money. To get a good view of relapse and persistent recovery, especially in the case of AN, a follow-up period of 2–5 years would have been more appropriate. Perhaps 1 year was also too short to allow mentalization skills to improve, in our sample with almost 90% comorbid avoidant personality disorder. For patients with BPD 1 year proved sufficient for improvement as shown in a study by Levy et al. [44]. We consider the correction for multiple testing a strength of our study.

In conclusion, we found recovery from an eating disorder 1 year after the start of treatment related to better mentalization and improvement of sensitivity to others and the capacity to manage new situations, two aspects of autonomy. The difference in mentalizing skills was already apparent before treatment; however, the difference in autonomy was acquired in the year of treatment. These results fit within the attachment-theory related model of eating disorders as dysfunctional strategies to deal with social ranking problems and interpersonal distress. Focusing on autonomy, mentalizing and emotional regulation in the treatment of eating disorders is important, not only because of their relation to recovery; but also because from eating disorder patients' perspective [86], self-esteem and social relations are the most important domains with regard to quality of life.

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**Compliance with ethical standards**

**Conflict of interest** On behalf of all authors, the corresponding author states there are no conflicts of interest.

**Ethical approval** This study has been approved by the Netherlands Medical Ethical Committee for Mental Health Institutions (Medisch-Ethische Toetsingscommissie Instellingen Geestelijke Gezondheidszorg, METIGG).

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