

A cognitive-behavioural therapeutic program for patients with obesity and binge eating disorder: short- and long term follow-up data of a prospective study

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3 **A cognitive-behavioural therapeutic program for patients with obesity and binge eating**
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5 **disorder: short- and long term follow-up data of a prospective study**
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Abstract

The goal of this study is to investigate the efficacy of a manualised cognitive behavioural therapeutic approach (CBT) for patients with obesity and binge eating disorder (BED) on the short and longer term. A prospective study without a control group consisting of three measurements (a baseline measurement and 2 FU assessments up to 5 years after the start of the CBT treatment) was used. Fifty six patients with obesity and BED (age: 39.7 ± 10.9 y; BMI: 38.5 ± 8.3 kg/m²) participated in the study. BMI, number of binges per week, general psychological well being, mood, attitude towards one's body and loss of control over the eating behaviour were evaluated by means of mixed models. Results indicate that a CBT approach offered 1 day a week during an average 7 months, produces benefits on eating behaviours, weight and psychological parameters, that are durable up to 3.5 years post-treatment.

Keywords: *binge eating, obesity, cognitive behavioural therapy, outcome, prospective study*

Introduction

The syndrome of Binge Eating Disorder (BED) was first described in 1959 by Stunkard (1959). However, the syndrome has not yet achieved official diagnostic recognition. In the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV) (American Psychiatric Association (APA), 2000), BED has been introduced within a new diagnostic category “eating disorders not otherwise specified”. It concerns eating disorders which do not meet the criteria for Anorexia Nervosa or Bulimia Nervosa. It is suggested that BED will be officially included in the next DSM-5 edition (APA, 2010, Wifley, Bishop, Wilson, & Agras, 2007).

The main criterion for BED entails recurrent episodes of binge eating: eating in a discrete period of time an amount of food that is definitively larger than most people would eat in a similar period of time and under similar circumstances. There is a strong sense of lack of control over the eating during the episode. Furthermore, binge eating episodes are associated with three (or more) of the following: 1) eating much more rapidly than normal, 2) eating until uncomfortable full, 3) eating large amounts of foods when not feeling physically hungry, 4) eating alone because of being embarrassed by how much one is eating and 5) feeling disgusted with oneself, depressed, or very guilty after overeating. To meet the DSM-IV criteria (APA, 2000), the binge eating occurs, on average, at least 2 days a week for 6 months and is not associated with regular use of inappropriate compensatory behaviours.

Epidemiological studies have shown binge eating disorder to be the most common of the eating disorders, with lifetime prevalence estimates in the community of 3.5% among women and 2.0% among men (Hudson, Hiripi, Pope, & Kessler, 2007, Jacobi, Wittchen, Holting, Höfler, Pfister, & Müller, 2004). Hence, BED is both present in men (40%) and women (60%) (Hudson, et al, 2007; Spitzer, Devlin & Walsh, 1992; Spitzer, Yanovski, Wadden & Wing, 1993; Hay, 1998). Although obesity is not a criterium for BED, there is a

1
2
3 strong association between them (Bulik & Reichborn-Kjennerud, 2003; Hudson, et al, 2007).

4
5 A study of Yager (2008) reports that 65% of the BED-patients are obese. Within a group of
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7 patients seeking treatment for obesity, the prevalence of BED was 26.6% (Fandiño, Moreira,
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9 Preissler, Gaya, Papelbaum, Coutinho, & Appolinario, 2010).

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12 Some differences between obese binge eaters and obese non binge eaters have been
13
14 reported. Obese binge eaters often show more severe obesity and greater eating disorder
15
16 psychopathology (more weight and shape concerns, greater ineffectiveness and body
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18 dissatisfaction, more emotional eating,...) more negative self-evaluations and lower self-
19
20 esteem compared to obese non binge eaters (Fandiño et al., 2010; Mitchell & Perderon
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22 Mussel, 1995; Wilfley, Wilson & Agras, 2003).

23
24
25 Furthermore, obese binge eaters show more comorbid psychiatric disorders and
26
27 symptoms such as depression and anxiety and more symptoms of the DSM-IV Axis II
28
29 disorders (personality disorders, mainly cluster B and C) (Hudson et al., 2007; Javaras et al.,
30
31 2008; Krynski & Ferraro, 2008; Mitchell & Perderon Mussel, 1995; Wilfley et al., 2003).

32
33
34 Because of the similarities between BED and Bulimia Nervosa (BN), outcome studies
35
36 for BED focused mainly on psychotherapies with proven effectiveness for BN, such as
37
38 cognitive behavioural therapy (CBT) (Grilo, Masheb, Wilson, Gueorguieva, & White, 2011),
39
40 interpersonal therapy (Wilson, Grilo, & Vitousek, 2007) and antidepressant drugs (Reas &
41
42 Grilo, 2008). Recently, in a comprehensive meta-analysis Vocks, Tuschen-Caffier,
43
44 Pietrowsky, Rustenbach, Kersting, & Herpertz, (2010) calculated effect sizes (change
45
46 between pre-and posttest) of the various randomized controlled CBT treatments. The results
47
48 reported large effect sizes for CBT in terms of reducing binge-eating, days without bingeing,
49
50 eating concern, shape and weight concern and moderate effects for depression with almost no
51
52 effect on body weight. It is concluded that in general CBT is accepted as the most effective
53
54 psychotherapeutic treatment for BED (Treasure, Claudina, & Zucker, 2010). However, Vocks
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3 and colleagues (2010) report that in most studies long-term treatment effects were not
4
5 estimated. Hence, there is a great need for further follow-up studies with extended
6
7 observation periods (Brownley, Berkman, Sedway, Lohr & Bulik, 2007; Dingemans, Bruna,
8
9 & van Furth, 2002; Vocks et al, 2010).

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11
12 The present study seeks to fulfil this gap and investigates the longer term results (up to
13
14 5 years after the start of the treatment) of a manualised cognitive behavioural therapeutic
15
16 (CBT) program for the treatment of patients with binge eating disorder and obesity in the
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18 University Psychiatric Center KULeuven Campus Kortenberg in Belgium
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25 **Material/ Subjects and Method**

26 27 **Treatment protocol for BED in the University Psychiatric Center KULeuven, Campus** 28 29 **Kortenberg, Belgium**

30
31 A manualised group-oriented CBT program for the treatment of patients with obesity
32
33 and binge eating disorder started in our center in 2005. The program runs one day a week (9
34
35 am- 4pm) during a 24 week period. When indicated, the patients can continue the treatment
36
37 after the 24-week period with a maximum of another 24 sessions. Hence the maximum
38
39 duration of the treatment is about one year. The treatment targets men and women with binge
40
41 eating disorder, often in combination with obesity. The program consists of well structured
42
43 group therapy sessions: maximum 9 participants are following a step-by-step manualised
44
45 CBT treatment (Vanderlinden, Pieters, Probst, & Norré, 2007; Vanderlinden, 2008). Hence a
46
47 maximum of 9 participants were allowed in a group at any given time.
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53 In the first part (morning session 9am-12am) the therapeutic program is focusing on a
54
55 variety of therapeutic goals such as : 1) psycho-education about the risks of obesity and binge
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57 eating, 2) increasing motivation for change, 3) learning new and healthy eating behaviours
58
59 (including self-monitoring of eating behaviour and record keeping), 4) increasing awareness
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3 of the different triggers of binge eating and learning alternatives to deal with these difficult
4
5 situations (and hence stop the bingeing) and 5) promoting an active life style and positive
6
7 body experience. Based on Hrabosky and colleagues (2007) patients are encouraged to
8
9 practice at least 30 minutes of exercise with moderate intensity- minimum five days a week.
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11 Loss of weight is not a primary goal. The main focus is on improving the general well-being
12
13 and quality of life of the patients.
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17 In a second part (afternoon 13.15pm-16pm) the therapy aims at challenging the so-
18
19 called maintaining factors of the eating disorder and several therapeutic modules are offered
20
21 integrating cognitive restructuring techniques where patients learn to identify and challenge
22
23 maladaptive cognitions regarding eating and weigh/shape thoughts. Other therapeutic
24
25 modules focus on improving self-esteem and assertiveness, learning to identify, tolerate and
26
27 express emotions and preventing relapse.
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30
31 The multidisciplinary team consists of a psychiatrist, a psychologist, a nutritionist, a
32
33 psychiatric nurse and a psychomotor therapist.
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35

36 At session 12 and at the end of the treatment (i.e. session 24, 36 or 48), an evaluation
37
38 of the therapeutic evolution takes place, where different aspects (normalisation of eating
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40 habits, self-monitoring in eating diary, stopping with dieting, number of binge eating
41
42 episodes, the use alternative strategies in confrontation with the binge eating triggers,
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44 incorporation of an active life style, body experience...) are discussed and evaluated. Based
45
46 on this evaluation, new and more appropriate therapeutic goals can be chosen and defined,
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48 when indicated.
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52 53 54 55 **Subjects**

56
57 The study was approved by the ethical committee of the University Psychiatric Center
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59 KULeuven. Written informed consent was obtained from all patients.
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3 In this study, 56 patients all diagnosed according to the DSM-IV criteria (APA, 2000) of
4 binge eating disorder were included. All BED patients consecutively referred to our centre,
5
6 were accepted. The only exclusion criteria were: psychosis and suicidal and/or para-suicidal
7
8 patients.
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11 The descriptive variables at the start of the treatment are summarized in Table 1. Overall, the
12
13 sample consisted of 48 women (86%) and 8 men (14%). The age of respondents was 40 ± 10.9
14
15 y and the duration of illness averaged 15 ± 9.9 y. The patients reported on average 5.2 binges
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17 (SD = 2.3) per week and they had a BMI of 38.5 ± 8.3 kg/m².
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25 -include table1 about here-

26 27 **Measurements**

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29 Several psychological tests were administered at the beginning of the treatment (time
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31 1) and 6 months later at the end of the 24 sessions (time 2). Next a second follow-up (FU)
32
33 assessment (time 3) was included. All patients who attended and terminated the treatment
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35 programme (since the start of the programme 5 years ago) were invited to collaborate in a
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37 third assessment (time 3). Of the original 56 patients who started and ended the treatment, FU
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39 data of 51 patients could be retrieved: 4 patients refused to participate in the third assessment
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41 period and 1 patient lived no longer at its original address and could not be traced. Hence only
42
43 5 patients (9%) dropped out of the study. The third assessment period (time 3) ranged from 1
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45 up to 4.5 years since the start of treatment. The mean time from treatment completion (time 2)
46
47 to time 3 assessment, was 29.1 ± 16.3 months, roughly about 3.5 years. All patients were
48
49 firstly asked by phone if they agreed to participate in another therapeutic screening and
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51 evaluation of their therapeutic progress. If consent was given to participate in the FU study,
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53 several questionnaires were sent with a covering letter, an informed consent paper, and an
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3 envelope for returning the questionnaires. Information about weight status and binge episodes
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5 were asked.
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8 In order to assess general psychological well being, the *Symptom Check List* (SCL-90;
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10 Arindell & Ettema, 1986) was used. Along with a global measure for psychoneuroticism, it
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12 measures complaints such as anxiety, depression, somatization, insufficient thinking,
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14 sensitivity, hostility, and sleeplessness. In this study, only the global psychoneuroticism scale
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16 (SCL total score) was used.
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20 The *Body Attitude Test* (BAT; Probst, Vandereycken, Van Coppenolle &
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22 Vanderlinden, 1995; Probst, 1997a; Probst, Van Coppenolle & Vandereycken, 1997b) is a
23
24 self-report questionnaire developed for patients suffering from an eating disorder. The
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26 questionnaire consists of 20 items to be scored on a 6 points scale and is intended to measure
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28 the subjective body experience and the attitude towards one's body. The maximum score is
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30 100: the higher the score, the more deviating the body experience is. The critical score - or
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32 cutoff score that distinguishes a person with an eating disorder from a non-patient - is
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34 established at 36. The BAT has excellent psychometric qualities demonstrating both a good
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36 internal reliability (Cronbach's alpha = 0.93) and short term test-retest reliability (interval one
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38 week; $r = 0.92$). The BAT has good convergent and discriminant validity (Probst, et al., 1995).
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40 The questionnaire is translated and validated in different languages.
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45
46 The *Beck Depression Inventory* (BDI II, Beck, Steer, & Brown, 1996) consists of 21-
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48 questions and is a multiple-choice self-report inventory. The BDI is one of the most widely
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50 used instruments for measuring the severity of depression. The standard cut-offs are as
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52 follows: 0-13: minimal depression; 14-19: mild depression; 20-28: moderate depression; and
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54 29-63: severe depression. Higher total scores indicate more severe depressive symptoms.
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58 The *Dissociation Questionnaire* (DIS-Q, Vanderlinden, Van Dyck, Vandereycken,
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60 Vertommen & Verkes, 1993) has besides a total score four subscales namely (1) identity

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3 confusion or fragmentation (referring to experiences of derealization and depersonalisation);
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5 (2) loss of control (referring to experiences of losing control over behavior, thoughts and
6
7 emotions) (3) amnesia (referring to experiences of memory lacunas); and (4) absorption
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9 (referring to experiences of enhanced concentration, which are supposed to play an important
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11 role in hypnosis). The DIS-Q has a good internal consistency (Cronbach's alpha=0.96),
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13 test-retest reliability (interval 3 weeks: $r=.92$) and validity (Vanderlinden, et al., 1993). The
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15 DISQ is translated and validated in different languages. Only the subscale "loss of control"
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17 was administered in this study. Items directly or indirectly refer to experiences of losing
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19 control over the eating behaviour for example "I find it very hard to resist bad habits", 'I
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21 regularly feel an urge to eat something, even when I am not hungry' and 'I gorge myself with
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23 food without thinking about it'.
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32 **Statistical analysis**

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34 To examine the evolution of BMI, psychological complaints and psychological well-
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36 being (SCL-90), depression (BDI), body attitude (BAT), and loss of control (DISQ subscale
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38 loss of control) during treatment and follow-up, separate two-level multilevel (or Linear
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40 Mixed) Models (LLMs) (Verbeke & Molenberghs, 2000) were estimated for each of these
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42 variables with repeated measurements (level 1) being nested within patients (level 2).
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44 Moreover, because it seems reasonable to assume that the evolution of these variables during
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46 treatment is different than the evolution after treatment, *piecewise* linear mixed models
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48 (LMMs) were used by including random intercepts at discharge and by including two time
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50 variables: (a) the first time variable indicates the *time of measurement during treatment*
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52 expressed in months before discharge (follow-up measurements after discharge are coded as
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54 zero for this variable); (b) the second time variable indicates *the time of measurement after*
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56 *treatment* expressed in months after discharge (measurements before discharge, during
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3 treatment, are coded as zero for this variable). An advantage of these piecewise LMMs is
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5 that it is possible to formally test whether trajectory during treatment and follow-up is
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7 different (or the same). While estimating these models, different specifications of the
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9 variance-covariance structure were considered and model selection was based on likelihood
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11 ratio tests and the procedures described in Verbeke and Molenberghs (2000). To examine the
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13 evolution of the number of binge episodes during and after treatment, a similar Generalized
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15 Linear Mixed Model (GLMM) for Poisson counts was estimated. In general, it may be noted
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17 that multilevel models have several advantages (e.g., see Gueorguieva & Krystal, 2004,
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19 Verbeke & Molenberghs, 2000): they use all available data, can properly account for
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21 correlation between repeated measurements on the same subject, can handle missing data
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23 adequately, and they have great flexibility to model time effects as demonstrated above.
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32 Results

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34 On average, participants followed the day treatment during a period of 29
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36 weeks \pm 12.7, which roughly corresponds to a period of 7 months.
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39 As can be seen in Table 2, a significant decrease can be observed for the number of
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41 binge episodes (by means of a GLMM for Poisson counts). On average, patients had 2.5
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43 binge episodes (both objective and subjective) at discharge compared to 5.2 binge episodes at
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45 the start. The number of estimated binge episodes decreases significantly during as well after
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47 treatment. However, the decrease is significantly slower after treatment than during
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49 treatment.
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53 A similar trajectory can be observed regarding weight and BMI. The decrease of the
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55 BMI was from 38.5 kg/m² to 36.6 kg/m² at discharge. Their BMI decreased, on average,
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57 with 0.31 kg/m² per month during the treatment. Consequently, after three months of
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59 treatment, patients' BMI was decreased on average by approximately one BMI point (3 x 0.31
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3 kg/m² ≈ 1 kg/m²). After treatment, patients' BMI remained stable (-0.04, not significantly
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5 different from zero) and did not decrease anymore. As a result, patients are characterized by a
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7 different evolution in BMI during and after treatment (p=0.0007 indicating a significant
8
9 difference in slopes during and after treatment) as can be seen in Figure 1a. In terms of
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11 weight, this means that the weight at baseline has dropped from 109.7±27.3 kg to only
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13 98.2±22 kg during the third FU assessment (after discharge).
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16
17 -insert table 2 about here-
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20 With respect to psychological well-being, the decrease of the SCL-90 was from 242 to
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22 191 on the SCL-90 at discharge. In Table 2, it can be verified that patients displayed a
23
24 significant decrease in overall-symptoms on the SCL-90 during as well as after treatment. On
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26 average, the SCL-90 dropped every month 4.19 points during treatment and 0.68 points after
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28 treatment. As can be noticed in Figure 1b (and also in Table 2) the decrease in the total score
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30 of the SCL-90 is significantly stronger during than after treatment.
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34 The average scores on the Beck depression questionnaire dropped from 28 to 17 at
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36 discharge, which is situated in the range of 'mild depression' and lower than the clinical
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38 threshold of 20. The depression scores decreased significantly during (with almost 1 point
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40 per month) as well as after treatment (with 0.13 points per month). The decrease in
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42 depression is stronger during treatment than after treatment (see figure 1c). At the third FU
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44 assessment, BDI scores dropped towards the range of 'minimal depression'.
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48 The decrease on the Body Attitude Test (BAT) was from 75.6 to 58 at discharge and
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50 their negative body attitude decreased significantly during as well as after treatment. Figure
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52 1d demonstrates that the decrease in negative body attitude was stronger during than after
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54 treatment. Finally, patients also experienced less loss of control during and after treatment:
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56 loss of control decreased from 3 to 2.4. Additionally, gains in control were stronger during
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58 treatment than after treatment (see Table 2, and Figure 1e).
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3 In general, we can conclude that for all these domains (except BMI), there is a
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5 significant decrease in symptomatology during treatment as well as after treatment but the
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7 decrease is less pronounced after treatment. For BMI, there is a significant decrease during
8
9 treatment and patients' BMI remains stable after treatment.
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12 -insert figures 1a b c d e about here -
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15 Discussion

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17 Our findings indicate that CBT offered 1 day a week during on average 7 months,
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19 produces benefits on both eating behaviours, weight and psychological parameters, that are
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21 durable up to 3.5 years posttreatment. This finding is most important since longer term FU
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23 data of CBT in BED and obesity are lacking (Vocks et al., 2010; Wilson, Wilfley, Agras, &
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25 Bryson, 2010). Compared to the initial assessment, patient's BMI and weight decreases
26
27 significantly during the treatment and this positive trajectory was maintained during the FU
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29 assessments. The weight loss at the third FU assessment is quite robust (on average about 11
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31 kilo's or 22 pounds compared with the initial assessment), however this finding is in contrast
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33 with data from other studies who report that CBT does not lead to significant changes in body
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35 weight (Bulik, Brownley & Shapiro, 2007; Wilson, et al., 2007). Considering the fact that
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37 studies are showing that a minor loss of weight significantly reduces health risks in the obese
38
39 (Bulik, & Reichborn-Kjennerud, 2003), this finding is encouraging. One of the reasons for
40
41 the significant weight loss might be the fact that physical activity was systematically trained
42
43 and coached on a weekly basis. At the same time patients were taught to incorporate
44
45 physical activity in daily life (minimum 5 times a week for a period of 30 minutes). Another
46
47 factor might have been the duration and intensity of our day program. For instance, in most
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49 CBT programs the manualised CBT program of Fairburn et al. (1993) is delivered consisting
50
51 of only 16 group 60-minute sessions (16 hours) over a 24-week period (see for instance
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3 Grilo, et al, 2011). Our patients received on average about 6 hours CBT per day over a 29-
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5 week period (together 174 hours)!

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8 One main focus of our treatment was to achieve a reduction of the number of binge
9
10 eating episodes and hence to decrease the moments of losing control over the eating
11
12 behaviour. For this purpose, the patients were strongly recommended to normalise their eating
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14 behaviours and eat minimum 3 times a day while stopping dieting. Our results also show a
15
16 positive change in those domains. Patients reported a significant decrease in number of binge
17
18 episodes. Nevertheless, they still report 2.5 binges a week. This number may still look quite
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20 high but based on our clinical experience (analysing the eating diaries during the day
21
22 treatment), we noticed that the amount of calories consumed during the binge episodes
23
24 decreased progressively the longer the treatment lasted. It might therefore be assumed that the
25
26 number of binges 2.5 reported at time 3, refers to both objective and subjective binges. Since
27
28 the eating diaries at time 3 were missing (evaluations were based on self-report), we did not
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30 had enough information to make the distinction between subjective and objective binge
31
32 episodes. The patients also report to have more inner control as assessed with the Dissociation
33
34 'Loss of Control' subscale. In fact, at the third FU assessment, the average score on the 'loss
35
36 of control' subscale of the DISQ, was situated within the range of norm scores for the general
37
38 population (Vanderlinden, et al,1993). We have to remark however that only 35% of the
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40 patients achieved total remission from binge eating at the third assessment (time 3), lower
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42 then reported in other studies (Grilo, et al, 2011).

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45 The high total score on the SCL questionnaire at the start of our treatment (mean total
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47 score on the SCL of 242 corresponds with percentile 100 compared to a normal population
48
49 and percentile 64 compared to a psychiatric population) indicates that our patients were
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51 suffering from a wide variety of psychological problems. Our patients sample also reported
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53 elevated scores on the Beck Depression Inventory namely an average score of 28 (situated in
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3 the range of moderate depression) demonstrating that they were also suffering from mild to
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5 severe depressive symptoms. It is therefore encouraging to notice that mixed-models analyses
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7 revealed significant time effects (improvements) for all measures also for depression. Based
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9 on the BDI score at the third FU assessment, our patient sample scored in the range of
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11 'minimal depression'. However, as can be expected, the evolution during and after the CBT
12
13 treatment differed. After treatment, patients still show a significant decrease on all these
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15 domains but the decrease is less pronounced than during treatment.
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20 Which factors may have been effective to provoke these positive changes? Here
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22 evidence-based answers are missing but we'd like to formulate some hypotheses waiting for
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24 more research. We assume that the combination of CBT and the introduction of an active life
25
26 style, may have provoked a positive evolution on both weight and mood. Patients were
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28 reporting that being able to practice more physical activity, helped them to increase their
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30 feelings of self-efficacy (Vancampfort, Adriaens, Vanderlinden, Sweers, Maurissen, &
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32 Knapen, 2010). Probably the physical activity may also have provoked a stress-reducing
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34 effect and hence may have decreased the urge to binge. The reduction in depressive symptoms
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36 may also be explained by the fact that the physical activity may have induced a change in
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38 beta-endorphins and/or monoamine neurotransmitters (including serotonin, dopamine,
39
40 noradrenalin) concentration in the brain (Dishman & O'Connor, 2009). Finally we believe
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42 that the interdisciplinary approach in combination with a structured 'step-by-step' CBT
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44 approach within a 'group framework' also contributed to the positive changes.
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51 However, we have to report some limitations of the study. Besides a rather small
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53 number of patients, a control group of patients who received no treatment or another
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55 treatment is lacking. Another limitation of the study is the fact that at the third assessment
56
57 (time 3), only self-reporting data were available. For future research we plan to enlarge our
58
59 patient sample and include a control group in order to be able to compare our results.
60

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Table 1: Descriptive variables of patients with binge eating disorder (N=56)

Characteristics	\bar{X}	SD
Age in years	39.7	10.9
Duration of illness in years	14.7	9.9
Number of binges per week	5.2	2.3
Average weight (kg)	109.7	27.3
BMI kg/m ²	38.5	8.3
	N	%
Number of women	48	86
Number of men	8	14
Marital status		
Unmarried	28	50
Married	24	43
Divorced	4	7
Education		
No	1	2
Primary	1	2
Secondary	22	39
Higher non-university	21	37
University	11	20

Note: BMI = Body Mass Index

Table 2.

Follow-up of BMI, psychological well-being, depression, body attitude, loss of control, and number of binge episodes during and after treatment: Results of mixed models.

	Estimate (SE)	Test	P value
BMI			
BMI at discharge	36.59 (0.95)		
Months before discharge (during treatment)	-0.31 (0.07)	F(1,51)=-4.69	<0.001
Months after discharge (during follow-up)	-0.04	F(1,36)=-1.60	0.12
Different evolution during versus after treatment		F(1,36)=13.92	0.0007
Psychological Well Being (SCL-90 total score)			
SCL-90 total score at discharge	190.78 (8.58)		
Months before discharge (during treatment)	-4.19 (0.99)	F(1,79)=17.79	<0.0001
Months after discharge (during follow-up)	-0.68 (0.26)	F(1,39)=6.87	0.0105
Different evolution during versus after treatment		F(1,79)=9.82	0.0024
Beck Depression Inventory (BDI)			
BDI at discharge	17.08 (1.50)		
Months before discharge (during treatment)	-0.91 (0.23)	F(1,44)=15.33	0.0003
Months after discharge (during follow-up)	-0.13 (0.03)	F(1,29)=13.06	0.0011
Different evolution during versus after treatment		F(1,29)=9.84	0.0039
Body Attitude Test (BAT)			
BAT at discharge	59.48 (2.44)		
Months before discharge (during treatment)	-1.26 (0.36)	F(1,80)=12.42	0.0007
Months after discharge (during follow-up)	-0.19 (0.09)	F(1,80)=5.10	0.03
Different evolution during versus after treatment		F(1,80)=7.15	0.0091
Loss of control			
Loss of control at discharge	2.37 (0.10)		
Months before discharge (during treatment)	-0.06 (0.01)	F(1,79)=19.64	<0.0001
Months after discharge (during follow-up)	-0.01 (0.003)	F(1,79)=6.15	0.02

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3 Different evolution during versus after treatment F(1,79)=11.77 0.001
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7 **Number of Binge Episodes**

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9 Number of binge episodes at discharge 0.93 (0.11)
10 exp(0.93)=2.5
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12 Months before discharge (during treatment) -0.09 (0.02) F(1,59)=34.78 <0.0001
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14 Months after discharge (during follow-up) -0.01 (0.01) F(1,59)=5.85 0.02
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16 Different evolution during versus after treatment F(17,28)=11.77 <0.0001
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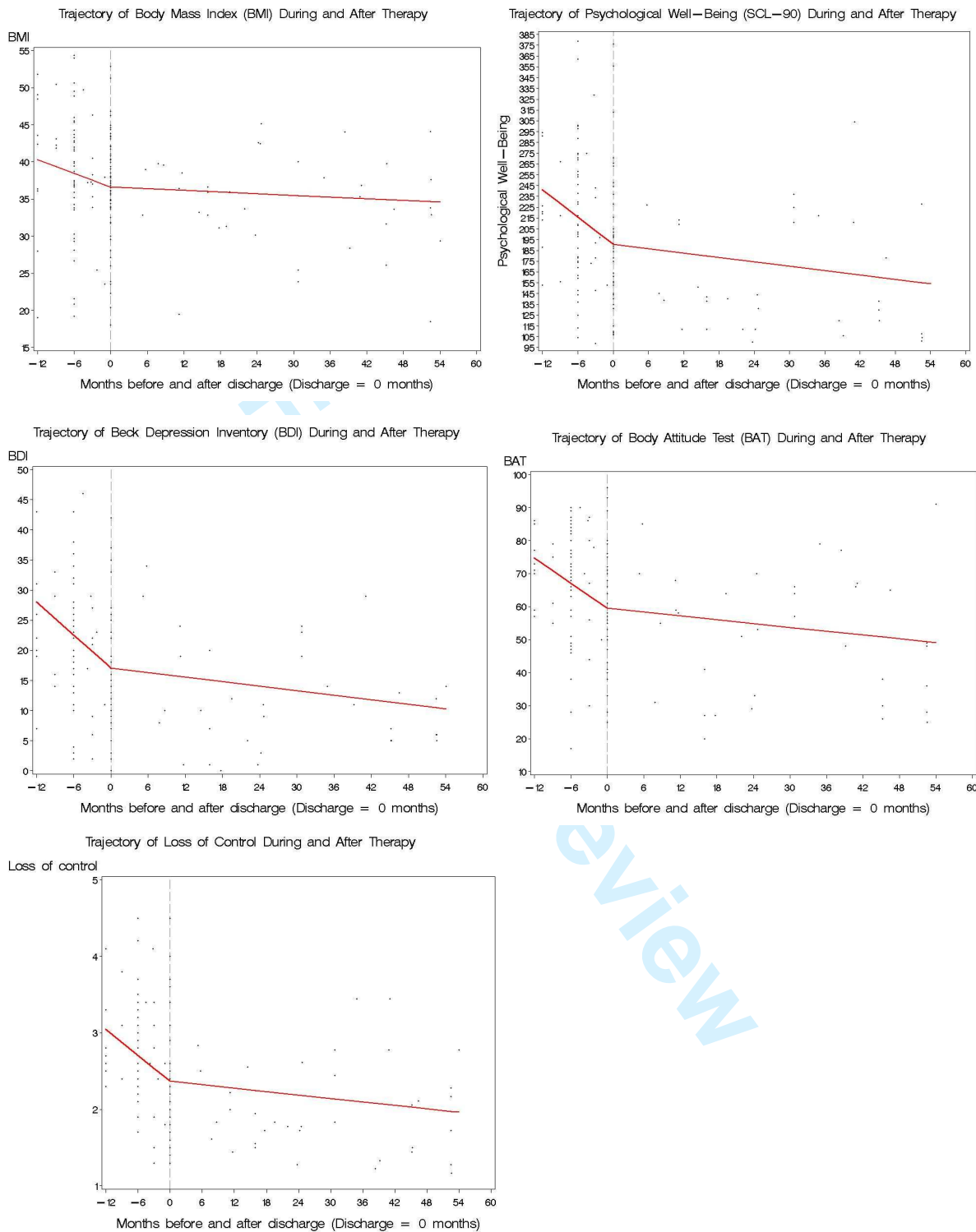


Figure 1a-b-c-d-e. Trajectory of BMI, psychological well being (SCL total score), depression (BDI-II), body attitude test (BAT), and loss of control (DISQ subscale loss of control) during and after treatment.