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Article:

Pellizzer, M., Waller, G. orcid.org/0000-0001-7794-9546 and Wade, T. (2018) Body image flexibility: A predictor and moderator of outcome in transdiagnostic outpatient eating disorder treatment. *International Journal of Eating Disorders*, 51 (4). pp. 368-372. ISSN 0276-3478

<https://doi.org/10.1002/eat.22842>

This is the peer reviewed version of the following article: Pellizzer, ML, Waller, G, Wade, TD. Body image flexibility: A predictor and moderator of outcome in transdiagnostic outpatient eating disorder treatment. *Int J Eat Disord*. 2018; 51: 368– 372, which has been published in final form at <https://doi.org/10.1002/eat.22842>. This article may be used for non-commercial purposes in accordance with Wiley Terms and Conditions for Use of Self-Archived Versions.

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**Body image flexibility: A predictor and moderator of
outcome in transdiagnostic outpatient eating disorder
treatment**

Journal:	<i>International Journal of Eating Disorders</i>
Manuscript ID	IJED-17-0544.R1
Wiley - Manuscript type:	Brief Report
Date Submitted by the Author:	n/a
Complete List of Authors:	Pellizzer, Mia; Flinders University , Psychology Waller, Glenn; University of Sheffield, Clinical Psychology Wade, Tracey; Flinders University , School of Psychology
Keywords:	Eating Disorders, Cognitive-Behavioral Therapy, Moderators, Predictors, Body Image Flexibility

SCHOLARONE™
Manuscripts

1 Number of Words (text only) = 1988

2 Number of Words (Abstract) = 188

3 Number of Tables = 1

4 Number of Figures = 1

5 19th January 2018

6

7 **Body image flexibility: A predictor and moderator of outcome in transdiagnostic**

8 **outpatient eating disorder treatment**

9

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22 *Acknowledgements:* Thank you to the therapists who were involved in this study: Ryan

23 Balzan, Samantha Boots, Emily Matheson, Jamie-Lee Pennesi, Cele Richardson, and

24 Eloisa Steen.

25 **For submission to:** *International Journal of Eating Disorders*

26 **Running head:** *BODY IMAGE FLEXIBILITY AND EATING DISORDERS*

Body Image Flexibility and Eating Disorders
2

1

Abstract

2 **Objective:** Predictors of attrition and predictors and moderators of outcome were explored
3 in a transdiagnostic sample of patients who received ten-session Cognitive Behavioral
4 Therapy (CBT-T) for non-underweight eating disorders. Body image flexibility, a
5 protective positive body image construct, was hypothesized to be a significant moderator.

6 **Method:** Data from two case series were combined to form a sample of 78 participants
7 who received CBT-T. Baseline measures of body image, negative affect, personality, and
8 motivation were included as potential predictors. Global eating disorder psychopathology
9 at each assessment point (baseline, mid- and post-treatment, 1- and 3-month follow-up)
10 was the outcome variable. Predictors of attrition were assessed using logistic regression,
11 and multi-level modelling was applied for predictors and moderators of outcome.

12 **Results:** Body image flexibility emerged as the strongest predictor and moderator of
13 global eating disorder psychopathology, followed by body image avoidance. Body
14 checking, negative affect, personality beliefs and self-efficacy were significant predictors
15 of global eating disorder psychopathology.

16 **Discussion:** Higher body image flexibility predicted lower global eating disorder
17 psychopathology at every assessment point. Further research is required to replicate
18 findings and explore the benefit of focusing on positive body image in treatment.

19 **Key Words:** Eating disorders; cognitive-behavioral therapy; moderators; predictors; body
20 image flexibility.

21

1 **The importance of body image flexibility in predicting outcome in transdiagnostic**
2 **outpatient eating disorder treatment**

3 Body image flexibility (BIF) is the ability to accept and experience both
4 positive and negative thoughts, beliefs, and feelings about one's body, and is considered to
5 be a protective factor for physical and psychological wellbeing (Sandoz, Wilson, Merwin,
6 & Kellum, 2013). Improvements in BIF appear to be associated with positive outcomes in
7 eating disorder symptoms, quality of life, and general mental health (Butryn et al., 2013),
8 even after controlling for general psychological flexibility (Lee, Ong, Twohig, Lensegrav-
9 Benson, & Quakenbush-Roberts, 2017). However, these studies assessed change
10 simultaneously, not allowing for causal interpretations. Only one study (adolescent
11 sample) shows prospectively that pre-treatment flexibility predicts post-treatment quality
12 of life and eating disorder risk, when controlling for baseline levels of these variables
13 (Bluett et al., 2016). The role of BIF in predicting treatment outcomes still needs to be
14 tested in adults with eating disorders.

15 While cognitive behavior therapy for eating disorders (CBT-ED) does not
16 explicitly target BIF, it does address two key behavioral manifestations of image
17 disturbance - body avoidance (avoidance of mirrors, weighing, tight clothing) and
18 checking (overuse of mirrors, pinching or measuring body parts) (Amin, Strauss, &
19 Waller, 2012). While both behaviors are considered to be risk and maintenance factors for
20 eating disorders (Amin et al., 2012), no study has evaluated whether either influences
21 treatment outcomes.

22 The aim of this study was to determine whether these three aspects of body
23 image predict and moderate the impact of cognitive-behavioral treatment (Waller, Tatham,
24 & Turner, 2016) considering their roles alongside other, known predictors of treatment
25 outcome (negative outcome, personality disorder pathology, and motivation. First, it is

1 hypothesized that motivation will be a significant predictor of drop-out (Vall & Wade,
2 2015). Second, it is hypothesized that higher levels of BIF and lower levels of body image
3 avoidance, body checking, negative affect, personality beliefs, and motivation will be
4 significant predictors of variance in global eating disorder psychopathology over the
5 course of treatment. Third, it is hypothesized that only the body image variables will
6 significantly interact with time to result in greater decreases in global eating disorder
7 psychopathology over the course of treatment.

8

9

METHOD

10 **Participants**

11 Data from two case series were combined to explore treatment predictors and
12 moderators, resulting in 105 participants being assessed for suitability (see
13 **Supplementary Figure 1**). Exclusion criteria included: any severe physical and/or
14 psychiatric condition that would interfere with treatment; already receiving eating disorder
15 psychotherapy; difficulty speaking/understanding English. Nine participants were
16 ineligible and four chose not to continue past assessment, thus 92 participants were
17 offered, and 78 (85%) started, treatment. In this latter group, mean age was 27.19 years
18 ($SD = 9.60$; range 15.69 – 68.97), mean BMI was 26.78 ($SD = 7.84$; range 18.20 – 52.40),
19 the majority were female (92.3%) and Caucasian (88.5%). Diagnosis, using DSM-5
20 criteria, was assessed at baseline and confirmed in supervision.

21 **Measures**

22 Participants completed measures at baseline (assessment session), mid-
23 treatment (session 4), post-treatment (session 10), and after one- and three-month follow-
24 up.

25 **Weight and frequency of disordered eating.** Height was measured at baseline

1 and weight at each therapy session. Frequency of objective bingeing, vomiting, and
2 laxative abuse were calculated each session (obtained from daily food intake diaries and
3 clarified during session). Laxatives and vomiting were combined to create a purging score,
4 given the low frequency of the former.

5 **Global eating disorder psychopathology.** The 22-item global eating disorder
6 psychopathology from the Eating Disorder Examination – Questionnaire (EDE-Q;
7 Fairburn & Beglin, 2008) was used. The EDE-Q global score has good psychometric
8 properties (Kelly, Carter, Zuroff, & Borairi, 2013; Mond, Hay, Rodgers, & Owen, 2006).
9 Internal consistency in the current study was .90.

10 **Body image flexibility.** The Body Image Acceptance and Action Questionnaire (BI-
11 AAQ; Sandoz et al., 2013) is a 12-item measure of BIF. Higher scores indicate greater BIF. It
12 has strong psychometric properties (see Pellizzer, Tiggemann, Waller, & Wade, 2017).
13 Internal consistency in the current study was .92.

14 **Body image avoidance.** The Body Image Avoidance Questionnaire (BIAQ; Rosen,
15 Srebnik, Saltzberg, & Wendt, 1991) assesses the avoidance of body image related situations.
16 The response format was changed from a 6-point to 7-point scale in the present study to
17 match that of the BI-AAQ. Psychometric properties vary across studies due to differing factor
18 structures (see Pellizzer et al., 2017). Internal consistency in the current study was .90. The
19 14-item version was recently found to have superior fit indices compared to other models
20 (Pellizzer et al., 2017) and thus was used for this study.

21 **Body checking.** The Body Checking Questionnaire (BCQ; Reas, Whisenhunt,
22 Netemeyer, & Williamson, 2002) is a 23-item measure of body checking behaviours. The
23 response format has been changed from a 5-point to 7-point scale in the present study to
24 match that of the BI-AAQ. Higher scores indicate greater body checking. Psychometric

1 properties vary across studies (see Pellizzer et al., 2017). Internal consistency in the present
2 study was .96.

3 **Negative affect.** The Depression Anxiety and Stress Scales (DASS21; Lovibond &
4 Lovibond, 1995) is a 21-item measure and a total higher score indicates greater negative
5 affect. The scale has good psychometric properties. Internal consistency was similar in the
6 current study ($\alpha = .94$ total score).

7 **Personality beliefs.** The 65-item Personality Beliefs Questionnaire (PBQ-SF; Butler,
8 Beck, & Cohen, 2007), based on DSM-5 personality diagnoses, yields a total score which
9 increases to indicate greater personality psychopathology. The measure has good
10 psychometric properties (Butler et al., 2007). Internal consistency was strong in the current
11 study ($\alpha = .96$ total score).

12 **Motivation and self-efficacy.** Two 100-point visual analogue scales: “How ready are
13 you to change?” and, “If you decided to change, how confident are you that you would
14 succeed?” assessed motivation and self-efficacy (Feld, Woodside, Kaplan, Olmsted, &
15 Carter, 2001). Both items are sensitive to changes in motivation and have predicted outcome
16 in treatment studies (see Steele, Bergin, & Wade, 2011).

17 **Procedure**

18 Participants were recruited from consecutive referrals to the Flinders University
19 Services for Eating Disorders outpatient clinic, after giving informed consent. They received
20 weekly therapy for ten weeks. Seven trainee psychologists administered the treatment under
21 weekly or bi-weekly supervision by two authors (GW and TW). Two adolescents were
22 included (assent and parent consent obtained), as Family Based Treatment was not
23 appropriate due to cost and family structure, and given the efficacy of CBT for adolescents
24 with BN.

25 **Statistical Analyses**

1 Analyses were conducted with IBM SPSS Version 22. Multi-level modelling (MLM)
2 was used, enabling inclusion of cases with missing data via maximum likelihood estimation.
3 Little's Missing at Random (MAR) test was used to assess whether data were missing at
4 random and predictors of attrition were assessed using binomial logistic regression.
5 Predictors were standardized to aid interpretation.

6 A predictor was considered to be a significant moderator if the size, sign, or strength
7 of the effect of time on the changing scores of the dependent variable (EDE-Q global score)
8 was dependent on the predictor (Kelly et al., 2013). Seven predictors were examined: BIF,
9 body image avoidance, body checking, negative affect, personality beliefs, readiness to
10 change, and self-efficacy. Models included a fixed- and random-effects portion, to model
11 constant and variable effects across participants. Intercept and time were included as random
12 effects and an autoregressive (AR[1]) structure for random error was applied. The
13 unconditional (null) "Model 1" and conditional "Model 2", where time was the sole
14 predictor, were first examined to confirm there was significant variance in global eating
15 disorder psychopathology and whether time explained some of that variance (i.e., a
16 significant change in psychopathology occurred over time). "Model 3", a conditional model,
17 included the main effects of time and the predictor, and a two-way interaction between time
18 and predictor. If a significant interaction existed, and to enable graphing, a dichotomous
19 variable of the predictor was created using a median split, and each analysis was rerun using
20 the dichotomous variable to generate the mean and standard error for the EDE-Q at each time
21 point for low and high values of the predictor.

22

23

RESULTS

24 Preliminary Analyses

25

All variables were normally distributed except purging. Little's test was non-

1 significant $\chi^2(116) = 115.75, p = .49$, indicating data were missing completely at random.

2 **Predictors of Attrition**

3 Attrition (starting treatment but terminating prematurely) occurred for 33/78
4 participants (42.31%). When considered individually, two variables emerged as significant
5 predictors of attrition: negative affect and personality psychopathology (**Supplementary**
6 **Table 1**).

7 **Predictors of Eating Disorder Symptoms**

8 **Table 1** presents the coefficients for all fixed effects in the null model and
9 conditional models predicting global eating disorder psychopathology. Model 1 shows
10 significant within- and between-subject variance in global eating disorder
11 psychopathology while Model 2 demonstrates a significant contribution of time to the
12 decrease in eating psychopathology. Model 3 results show that, with the exception of
13 readiness to change, all variables were significant predictors of variance in eating
14 psychopathology in the expected directions in addition to time. The greatest impact was
15 that of BIF, followed by body image avoidance, negative affect, body checking,
16 personality beliefs, and self-efficacy.

17 Only two significant interactions with time emerged - BIF, $F(1, 46.34) = 5.97$,
18 $p = .02$, and body image avoidance, $F(1, 167.46) = 6.24, p = .01$. Participants with high
19 BIF had significantly lower eating disorder symptoms at every time point and participants
20 with lower body image avoidance had significantly lower eating disorder symptoms at
21 baseline, mid-treatment, and post-treatment (see **Figure 1**). Fit indices support the BIF
22 model as being closest to the true model.

23 Analyses were rerun sequentially including age, duration of eating disorder, and
24 negative affect as covariates. Only negative affect significantly contributed to outcome,
25 but it did not change the pattern of significance of other variables (with the exception of

1 personality beliefs, which was no longer a significant predictor). Readiness to change
2 became a significant predictor when duration was included in the model.

3

4

DISCUSSION

5 Contrary to the first hypothesis, neither readiness to change or self-efficacy
6 were significant predictors of dropout in this brief version of CBT-ED. The second
7 hypothesis was partially supported, as all variables (excluding readiness to change) were
8 significant baseline predictors (in the predicted directions) of changes in global eating
9 disorder psychopathology over treatment. The third hypothesis was also partially
10 supported, as BIF and avoidance (but not checking) at the start of treatment were
11 moderators between time and global eating disorder psychopathology over the course of
12 treatment. BIF was the stronger predictor, with higher flexibility predicting significantly
13 better outcomes at each assessment point. Less body image avoidance was associated with
14 significantly better outcomes over treatment, though not follow-up. The focus on
15 overcoming body image avoidance during CBT-ED might allow patients higher in
16 avoidance to 'catch up' by follow-up.

17 While other variables were not moderators, the majority were significant
18 predictors of variance in global eating disorder psychopathology (Linardon, Garcia, &
19 Brennan, 2017; Vall & Wade, 2015), with the exception of readiness to change. It has
20 previously been suggested and found that behavioral change, rather than stated motivation,
21 is a more powerful predictor of outcome (Waller, 2012). Thus, the use of CBT-T (which
22 strongly emphasizes early behavioral change) might make baseline motivational measures
23 irrelevant to outcome.

24 Further research is needed to address limitations. CBT-T is a new, shorter
25 therapy that has thus far only been evaluated with case series. Future investigation of

1 moderators using a randomized controlled design with a longer follow-up and larger
2 sample size is needed to confirm the importance of body image variables as a moderator of
3 treatment. Patients with a BMI under 17.5 were not included, so findings cannot be
4 generalized to this population.

5 Future treatment studies should explore whether focusing on BIF increases rates
6 of remission and good outcome, either by modifying treatment protocols or using adjunct
7 therapies. For example, imagery rescripting (IR) has been found to result in significantly
8 higher BIF compared to a cognitive dissonance intervention in a sample of body-
9 dissatisfied young women (Pennesi & Wade, 2018). Improvements in BIF post-treatment
10 have been found with a number of treatments, including CBT, Acceptance and
11 Commitment Therapy (ACT), and mindfulness (Bluett et al., 2016; Butryn et al., 2013;
12 Lee et al., 2017).

13
14

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- 20

Body Image Flexibility and Eating Disorders
14

1 Table 1

2 *Fixed effect estimates and model fit indices for models predicting eating disorder symptoms.*

	Intercept	Time	Predictor	Predictor * Time	AIC	BIC	Within-Subjects Variance	Between-Subjects Variance
Model 1	2.75 (.13) **				915.43	926.06	1.56 (.16) **	.82 (.23) **
Model 2	4.33 (.12) **	-.65 (.05) **			741.04	758.75	.70 (.07) **	.05 (.01) **
Model 3:								
BI-AAQ	4.30 (.10) **	-.66 (.05) **	-.92 (.11) **	.12 (.05)*	664.49	689.23	.53 (.06) **	.04 (.02)
BIAQ	4.32 (.10) **	-.65 (.05) **	.81 (.11) **	-.13 (.05)*	686.87	711.63	.56 (.06) **	.04 (.01) **
BCQ	4.32 (.11) **	-.66 (.05) **	.66 (.12) **	-.08 (.06)	703.58	728.35	.62 (.06) **	.04 (.01) **
DASS	4.33 (.11) **	-.65 (.05) **	.73 (.11) **	-.08 (.05)	673.37	697.99	.58 (.06) **	.03 (.01) **
PBQ	4.36 (.11) **	-.67 (.05) **	.57 (.12) **	-.10 (.06)	716.30	741.06	.64 (.07) **	.04 (.01) **
Readiness to Change	4.32 (.12) **	-.65 (.05) **	-.31 (.12)	.05 (.05)	725.71	750.36	.69 (.07) **	.05 (.01) **
Self-Efficacy	4.32 (.11) **	-.65 (.05) **	-.50(.12) **	.06 (.05)	711.14	735.79	.66 (.07) **	.04 (.01) **

3 *Note.* * $p < .05$; ** $p < .001$.

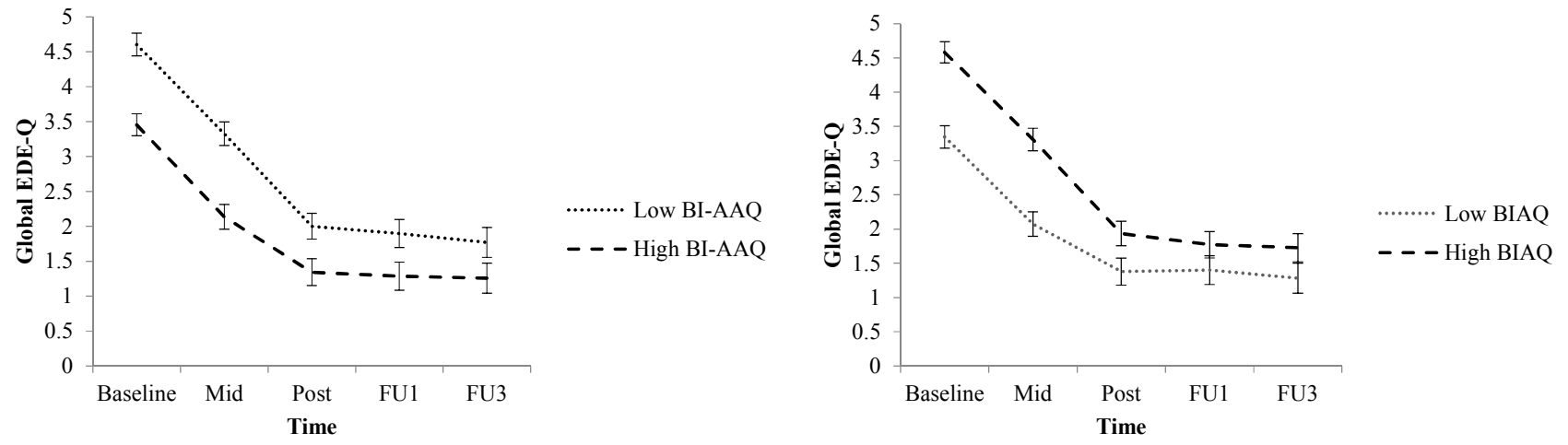
4 Predictors were only considered significant if $< .01$ to correct for multiple comparisons.

5 Estimate (Standard Error).

6 BI-AAQ = Body Image Acceptance and Action Questionnaire; BIAQ = Body Image Avoidance Questionnaire; BCQ = Body Checking Questionnaire; DASS = Depression

7 Anxiety and Stress Scales; PBQ = Personality Beliefs Questionnaire

8



1
 2 Figure 1. Body image flexibility (BI-AAQ) and Body image avoidance (BIAQ) x Time predicts rate of change in eating disorder symptoms
 3 (EDE-Q).
 4 *Note.* The median was used to split scores into high and low. High scores are 31 and above for body image flexibility and 53 and above for body
 5 image avoidance.

1 Supplementary Table 1

2 *Binary logistic regression analyses assessing predictors of attrition*

Variable	Completers <i>M</i> (<i>SD</i>)	Attrition <i>M</i> (<i>SD</i>)	OR (95% CI)
Body image flexibility	30.66 (12.40)	32.41 (14.04)	1.15 (0.72 – 1.82)
Body image avoidance	50.58 (15.51)	53.69 (19.17)	1.20 (0.76 – 1.91)
Body checking	86.26 (26.84)	92.81 (37.10)	1.24 (0.78 – 1.96)
Negative affect	26.08 (13.74)	33.34 (14.08)	1.72 (1.05 – 2.81)
Personality beliefs	83.19 (36.17)	111.34 (47.95)	2.04 (1.21 – 3.45)
Readiness to Change	81.81 (20.88)	75.53 (17.97)	0.72 (0.45 – 1.16)
Self-Efficacy	63.70 (22.53)	62.03 (21.91)	0.93 (0.59 – 1.47)

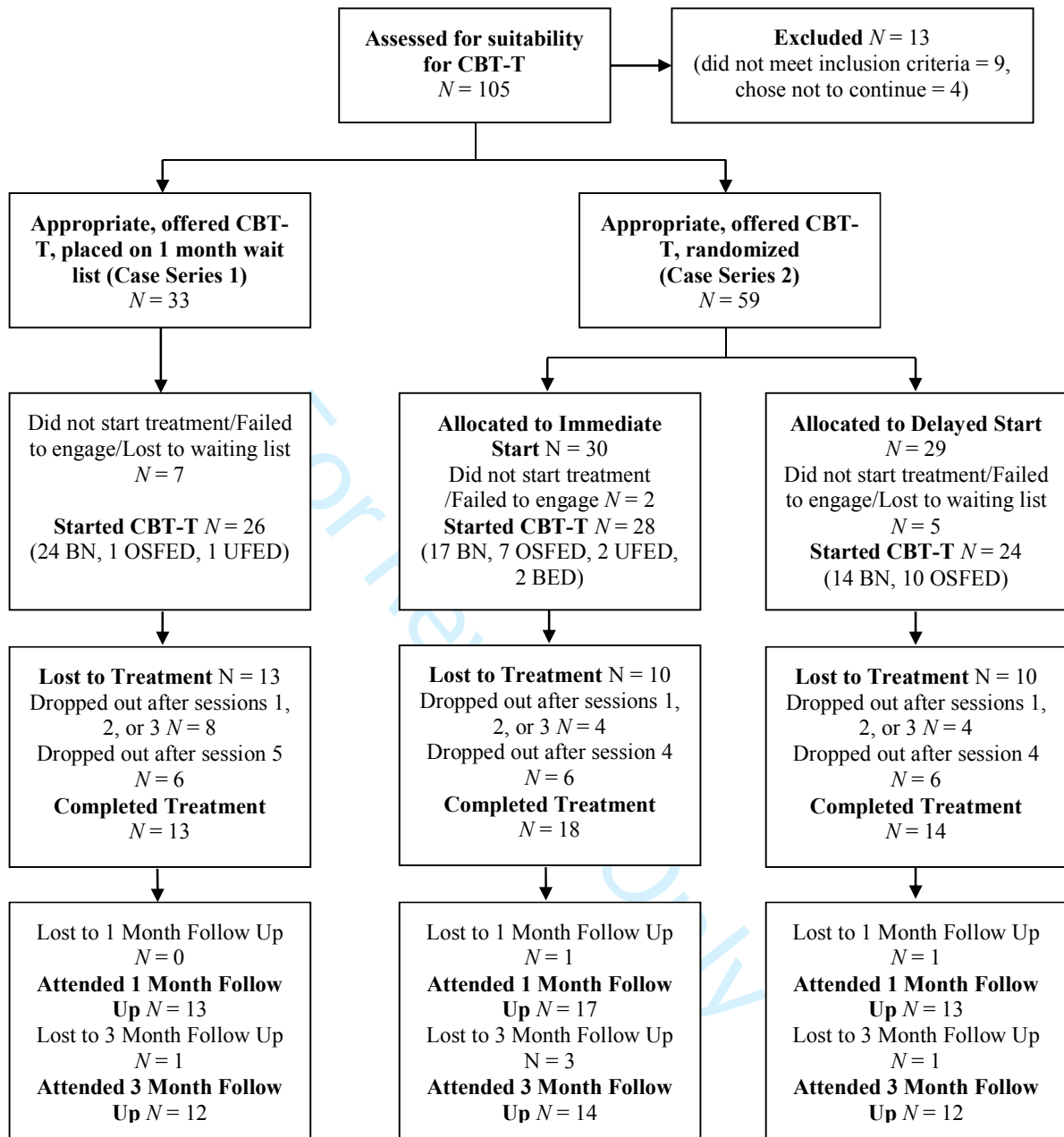
3 *Note.*

4 Significant analyses are bolded.

5 Means and standard deviations for original, unstandardized predictors.

6

1



2

3 Figure 1. CONSORT diagram

4 Note. BN = Bulimia Nervosa, OSFED = Other Specified Feeding and Eating Disorder, UFED = Unspecified

5 Feeding and Eating Disorder, BED = Binge Eating Disorder.