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Indicators of early change in cognitive behaviour therapy that predict eating disorder remission☆

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ABSTRACT

We examined the utility of three definitions of rapid response to treatment for predicting remission in a transdiagnostic sample receiving 10-session cognitive behaviour therapy (CBT) for an eating disorder. Both efficiency (categorising the greatest number of people as rapid responders) and predictiveness (performs best in predicting outcomes) were compared. The participants (N = 176, 93 % female, 89 % white, mean age 26.65 years) completed measures at baseline and before session 4 of CBT which was used to calculate rapid response. Remission was achieved by 64 participants (36 %) at the end of therapy. A multivariable logistic regression analysis was used to examine the contribution of rapid response, as well as baseline disordered eating, impairment, general negative emotion, to remission status. Two of the rapid response definitions were associated with participants being 2.5 times more likely to achieve remission at end of treatment. In both cases, remission was also associated with a lower level of baseline eating disorder psychopathology. The preferred definition (a reduction of ≥1.13 points on the Eating Disorder Examination Questionnaire) categorised 58 % of participants as rapid responders. These findings can be used to inform clinicians of meaningful early change that predicts positive outcomes in brief CBT for eating disorders. Early change indicators can inform collaborative consideration of barriers to progress and approaches to tackle these, making CBT more effective for more people. The conclusions should be interpreted with caution given remission was only examined at end of treatment and not over longer-term follow-up.

1. Introduction

Early symptom reduction in eating disorder (ED) treatment is the most reliable and robust predictor of a better outcome (Vall & Wade, 2015). It also enhances therapeutic alliance (Graves et al., 2017), particularly for therapies with a strong behavioural component, such as cognitive behaviour therapy (CBT). The association between early symptom change and outcome has been replicated across many studies (Chang et al., 2021), with significant, moderate associations, $r = 0.41$. Of the 33 studies included in the Chang and colleagues (2021) meta-analysis, the majority ($N = 23$, 70 %) examined early reduction in disorder-specific symptoms (e.g., weight gain, reduction in objective binge episodes and/or purging). Ten examined early reductions in ED psychopathology (a transdiagnostic indicator) measured in all cases using the global score from the Eating Disorder Examination interview (EDE; Fairburn et al., 2008) or self-report questionnaire (EDE-Q; Fairburn & Beglin, 2008). While the global score is largely comprised of cognitive symptoms, it also includes behavioural and diagnostic items and differentiates between cases and non-cases of eating disorders identified with interviews (Berg et al., 2012; Mond et al., 2004).

Use of a transdiagnostic index to assess early change is more useful in routine care, as it can be implemented across samples of mixed ED groups to predict treatment response. To maximise utility in these settings, it is important to provide an *a priori* reduction score (i.e., an amount by which eating psychopathology decreases early in treatment that indicates a likely good treatment outcome). Only three studies, summarised in Table 1, have tested such an *a priori* 'reduction score' for eating psychopathology, each informed by the reliable change index (RCI) as a good predictor of treatment outcome. Across these three studies (Bell et al., 2017; Jenkins et al., 2021; Raykos et al., 2013) there

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Table 1
Tests of an *a priori* value of reduction in ED psychopathology and its association with treatment outcome.

Study	Population	Early Change Index	Outcome
Bell et al. (2017)	*N* = 164 adult outpatients of receiving various treatments in the UK	Reduction ≥ 1.13[a] in EDE-Q global by session 8 (35 %)	EOT EDE-Q global score, not behaviour or BMI
Raykos et al. (2013)	*N* = 105 adult outpatients with EDs who received CBT-E in Australia	Reduction ≥ 1.52[b] in EDE-Q global by Sessions 3–6 (34 %)	EOT EDE-Q global, more likely to achieve full remission, required significantly fewer treatment sessions
Jenkins et al. (2021)	*N* = 72 adult outpatients with BN or BED receiving CBT-GSH in the UK	Reduction ≥ 1.34[c] in ED-15 Total before session 6 (24 %)	More likely to achieve full remission at EOT

Note: EOT = End of Treatment; EDE-Q = Eating Disorder Examination Questionnaire; BMI = Body Mass Index; ED = Eating Disorders; CBT -E = Cognitive Behavioural Therapy for Eating Disorders; BN = Bulimia Nervosa; BED = Binge Eating Disorder; CBT-GSH = Cognitive Behavioural Therapy Guided Self-Help; RCI = reliable change index.

[a] See page 689, the total percentage of cases meeting criteria for reliable and clinically significant improvement in EDE-Q global scores was calculated based on Jacobson and Truax criteria, applying a diagnostic cut-off of 2.77 and a reliable change index of 1.13 which were derived from norms reported by Fairburn and Beglin (1994). To determine rapid response in global EDE-Q scores, cases had EDE-Q change scores ≥1.13.

[b] RCI derived from data reported in the study, page 766.

[c] RCI derived from data reported in the study, page 2145.

were a variety of therapeutic modalities offered across different lengths of therapy, with the reduction score over the first three to eight sessions of treatment used to identify rapid responders. Use of this reduction score in everyday clinical practice could facilitate decisions about the need to adapt the treatment protocol in some way for slower responders (Wade et al., 2024). Such adaptations can result in commensurate treatment outcomes across rapid and slower responders (Chen et al., 2017).

The aim of the current study is to use each of the three reduction scores developed in heterogenous samples and therapies (Table 1) to categorise rapid response by session 4 and compare them with respect to their ability to predict remission in a transdiagnostic sample receiving 10-session CBT for an ED. We aimed to determine which of the three was most fit for use in terms of both efficiency and predictiveness, while controlling for competing explanations of early change, including initial levels of disordered eating, general emotional distress and clinical impairment. Efficiency refers to categorising the greatest number of people as rapid responders so that fewer people are moved to expanded treatment. Predictiveness indicates that the value performs best in predicting outcomes.

2. Materials and methods

2.1. Data

This secondary data analysis used data from four consecutive clinical trials conducted at the Flinders University Services for Eating Disorders (FUSED), described in detail previously (Keegan et al., 2024; Pellizzer et al., 2019a, 2019b; Wade et al., 2021). Most participants received CBT-T (Waller et al., 2019), which has five phases, including early dietary change and exposure, behavioural experiments related to food, addressing emotional triggers, body image work, and relapse prevention – the protocol can be located on https://cbt-t.sites.sheffield.ac.uk/. A key difference from longer forms of CBT-ED is that behavioural and dietary change are stressed from the very outset of treatment, rather than being delayed. One study (Wade et al., 2021) randomised participants to 10 sessions of guided self-help CBT-ED, following the protocol described in the Overcoming Bulimia Nervosa and Binge Eating (Cooper, 1993), or CBT-T.

All studies were approved by an Institutional Research Ethics Committee: Southern Adelaide Clinical Human Research Ethics Committee (204.15) and the Social and Behavioural Research Ethics Committee at Flinders University (8613). The studies were pre-registered with the Australian New Zealand clinical trials registry (ACTRN12621000111875 and ACTRN12621000435886). The data that support the findings of this study are available at https://osf.io/hcqrk/

2.2. Design

All participants received 10-session CBT for ED, either CBT-T (Waller et al., 2019) or guided self-help (Wade et al., 2021). Therapy was delivered by trainee psychologists under expert supervision. Assessments were conducted at baseline, session 4 and session 10 (end of treatment). To be included in the current analyses, participants were required to have completed the baseline and session 4 assessments, so that early change could be defined. Of the 272 participants who started treatment at FUSED, 176 (65 %) met this criterion. Those who completed baseline only (*N* = 91, 33.5 %), baseline and session 10 only (*N* = 4, 1.5 %), or sessions 4 and 10 only (*N* = 1) were not included in the analyses. Session 10 assessment was not available for 56 participants (32 %). Unless earlier discharge was agreed on collaboratively due to remission being achieved, it was assumed that these 56 people did not achieve remission at end of treatment.

2.3. Participants

The baseline characteristics of the 176 participants are reported in Table 2.

2.4. Measures

2.4.1. Definition of remission

The Bardone-Cone et al. (2010) definition of remission was modified for the current study. This definition has three components. The first is that the global EDE-Q score should be ≤ 2.77, representing a score within one standard deviation of the community mean (Mond et al., 2004). Second, body mass index (BMI) should be > 18.5 (not meeting criteria for being underweight). Third, there should be no ED behaviours in the previous three-month period. Given our brief treatment period and given that the EDE-Q assesses the last 28 days, we modified this criterion to the last month of treatment.

2.4.2. Definitions of rapid responder

The first definition (Bell et al., 2017) was an early reduction in the

Table 2
Comparison of baseline variables between participants included in the analyses versus those not included.

Baseline variable	Included in the analysis (N = 176) Mean (SD)	Not included in analyses (N = 96) Mean (SD)	OR (95 % CI)	*p* value
Body mass index	27.51 (8.40)	25.48 (7.99)	1.03 (1.00–1.07)	0.05
EDE-Q global	4.10 (1.06)	4.12 (1.10)	0.98 (0.78–1.24)	0.86
ED15 (weight, shape and eating concern)	4.05 (1.13)	3.99 (1.10)	1.05 (0.81–1.35)	0.72
Impairment	20.51 (16.20)	22.48 (15.89)	0.99 (0.98–1.00)	0.33
General negative emotion	30.05 (32.11)	38.27 (34.49)	0.99 (0.99–1.00)	0.06

EDE-Q global score by 1.13 points (Table 1). The EDE-Q global score is based on the mean of four subscales (concerns about eating, weight and shape, and dietary restraint), and can range from 0 to 6. Higher scores indicate more severe ED psychopathology. This global scale has good psychometric properties and is widely used to assess and monitor eating disorders in clinical practice and treatment outcome studies (Rand-Giovannetti et al., 2020). Cronbach's alpha for this measure ranged between 0.78 and 0.90 across the four treatment studies (Keegan et al., 2024; Pellizzer et al., 2019a, 2019b; Wade et al., 2021). The second definition (Raykos et al., 2013) was a reduction in the EDE-Q global score by 1.52 points.

The third definition of rapid response (Jenkins et al., 2021) was a decrease of 1.34 points in ten items from the ED15, a 15-item questionnaire that assesses behaviours and cognitions during the previous week (Tatham et al., 2015). Six items assess weight and shape concerns (e.g., "felt distressed about my body shape") and four assess eating concerns (e.g., "worried about losing control over eating") on a seven-point Likert scale (0 = not at all to 6 = all the time). Higher ratings indicate higher levels of psychopathology. Five additional questions assess the frequency of disordered eating behaviours, but these do not contribute to those two scales. The reliability and validity of the ED15 has been supported (Zhou et al., 2024), and Cronbach's alpha and McDonald's Ω for the ten items in this sample is 0.89.

2.4.3. Baseline variables covariates

Impairment. The 16-item Clinical Impairment Assessment Questionnaire (CIA; Bohn et al., 2008) is a self-report measure of psychosocial impairment in the past 28 days attributed to experiencing an eating disorder. Impact on areas of functioning such as mood and self-perception, cognitive functioning, work performance, and interpersonal functioning are measured on a 4-point Likert scale (0 = Not at all to 3 = A lot). The CIA correlates with ED psychopathology, and has good discriminant (Jenkins, 2013) and predictive validity (Maraldo et al., 2021). In the current sample, Ω = 0.90 (Zhou et al., 2024).

General negative emotion. The total score of the 21-item version of the Depression Anxiety Stress Scale (DASS-21; Lovibond & Lovibond, 1995) was used, where factor analysis indicates that a general factor of psychological distress or general negative emotion exists (Makara-Studzińska et al., 2022). Participants rate the extent to which a statement applies to them in the past week on a 4-point Likert Scale (0 = Never, 3 = Almost Always). Mean item scores were calculated for each subscale. Higher scores indicate higher severity of symptoms. In the current sample, Ω = 0.94.

2.5. Data analysis

Logistic regressions were used to compare those participants who were included in our analyses and those who were not, and those who were classified as remitted versus those who were not. Correlations between potential confounders for early change (baseline ED psychopathology (EDE-Q), impairment and negative emotion) and early change were examined and were all significant (r's = 0.37, 0.17, 0.19 respectively, all p's < 0.05). Therefore, each of the three definitions of rapid remission were entered into a multivariable logistic regression where remission was the outcome variable, and examined simultaneously with baseline levels of ED psychopathology, impairment, and general negative emotion. As the EDE-Q and ED15 measure similar constructs (Zhou et al., 2024) and were highly correlated in the current sample, $r = 0.74$, p < .001, the ED15 was not included in these analyses.

3. Results

3.1. Sensitivity analyses

Table 3 shows that there were no significant differences between the 65 % of the 272 participants who started treatment at FUSED and had sufficient data for inclusion in the analyses versus the 35 % who did not. Data were therefore considered missing at random.

3.2. Baseline predictors of remission

Table 3 shows the baseline characteristics and scores of those patients who did (N = 64, 36 %) or did not meet criteria for remission by the final session of therapy. This remission rate is consistent with meta-analytic data for CBT for ED, with 28.7 % remission for intention-to-treat analyses and 37.1 % for those completing treatment (Linardon & Wade, 2018). Only three baseline variables significantly differentiated between those who remitted and those who did not - the global score of the EDE-Q, ED15 wt, shape and eating concerns, and diagnosis. People who achieved remission at the end of treatment had significantly lower initial levels of eating psychopathology and were more likely to have a diagnosis other than bulimia nervosa.

3.3. Multivariable prediction of remission

Considering *predictiveness*, Table 4 shows that the first two definitions of rapid response (using reductions in the EDE-Q) contributed

Table 3
Baseline descriptives of the whole sample, and by remission status.

Baseline Variable	Whole sample N = 176	Remission attained N = 64	Remission not attained N = 112	OR (95 % CI)	p value
	M (SD)	M (SD)	M (SD)		
Age (years)	26.65 (9.67)	26.43 (9.71)	26.78 (9.70)	1.00 (0.97–1.03)	0.82
ED duration	9.54 (9.05)	10.25 (10.85)	9.13 (7.88)	1.01 (0.98–1.05)	0.44
N female (%)	164 (93)	58 (91)	106 (95)	1.83 (0.56–5.92)	0.32
N White ethnicity[a] (%)	156 (89)	58 (91)	98 (88)	0.77 (0.25–2.32)	0.64
ED diagnosis (%)					
Bulimia nervosa (BN)	110 (63)	33 (52)	77 (69)	**2.07 (1.10–3.89)**	
Anorexia Nervosa	5 (3)	2 (3)	3 (3)		
Binge eating disorder	6 (3)	3 (3)	3 (3)		**0.02**
Other specified feeding and ED	50 (28)	22 (34)	28 (25)		
Unspecified feeding and ED	5 (3)	4 (6)	1 (1)		
Body mass index	27.51 (8.40)	27.72 (8.09)	27.39 (8.61)	1.01 (0.97–1.04)	0.81
EDE-Q global	4.10 (1.06)	3.76 (1.17)	4.30 (0.94)	**0.62 (0.46–0.83)**	**0.002**
ED15 (weight, shape, eating concern)	4.05 (1.13)	3.77 (1.19)	4.21 (1.07)	**0.71 (0.52–0.96)**	**0.03**
Impairment	20.51 (16.20)	19.52 (16.13)	21.08 (16.29)	0.99 (0.98–1.01)	0.54
General negative emotion	30.05 (32.11)	25.42 (27.26)	32.64 (34.37)	0.99 (0.98–1.00)	0.16

Note: bolded entry means significant difference between remission groups.
ED = Eating Disorder; EDE-Q = Eating Disorder Examination Questionnaire.
[a] Asian (N = 9), African (N = 2), other (N = 6).

Table 4
Multivariable logistic regression with remission status as the outcome.

Independent variables	Rapid response indicators		
	≥1.13 EDE-Q decrease *N* = 102 (58 %) OR (95 % CI) *p*	≥1.52 EDE-Q decrease *N* = 73 (42 %) OR (95 % CI) *p*	≥1.34 in ED-15 Total *N* = 41 (23 %) OR (95 % CI) *p*
Rapid response indicator	**2.58 (1.23–5.40) 0.01**	**2.58 (1.28–5.22) 0.008**	1.54 (0.72–3.28) 0.26
Baseline EDE-Q Global	**0.52 (0.37–0.74) <0.001**	**0.53 (0.38–0.75) <0.001**	**0.60 (0.44–0.83) 0.002**
Baseline impairment	1.02 (0.99–1.06) 0.25	1.02 (0.99–1.06) 0.20	1.02 (0.99–1.06) 0.26
Baseline Negative Emotion	0.99 (0.97–1.01) 0.20	0.99 (0.97–1.01) 0.18	0.99 (0.97–1.01) 0.24

Note: bolded entry means significant difference between remission groups; EDE-Q = Eating Disorder Examination Questionnaire; the respective association between the rapid response indicator and remission in univariate regression is 1.49 (0.79–2.80), 1.73 (0.93–3.23), and 1.73 (0.85–3.52).

unique variance to remission status, in addition to the baseline global EDE-Q score. Both definitions were equally predictive. In terms of *efficiency*, the first definition (EDE-Q decreases by 1.13 points or more) was preferred, as over half the sample met this requirement (58 %) compared to only 42 % for the second definition. Neither impairment nor general negative emotion contributed unique variance across any of the rapid remission definitions. We note that when early change was considered alone in the regression, confidence intervals became broader across all three definitions of early change, thus decreasing our precision to examine predictiveness of early change.

4. Discussion

A key clinical skill is to be able to predict remission as soon as possible in therapy, so that the clinician can adapt the therapy as necessary to improve the patient's chances of recovery (e.g., Wade et al., 2024). Early change is the most robust predictor of outcomes in treating eating disorders (Chang et al., 2021; Vall & Wade, 2015), so if adequate levels of early change can be identified, this can help clinicians to know when to make such adaptations. This study has contrasted three different ways of defining adequate levels of early change to achieve remission, so that the most predictive and efficient can be used to inform clinical practice. The transdiagnostic sample consisted of those who had provided early change data in one of four previous studies of 10-session CBT for eating disorders. The findings were robust, with no impact of most baseline characteristics, including clinical impairment and general negative emotion.

The EDE-Q was the more useful measure for identifying adequate early change. It was also the only baseline measure that predicted additional outcome variance. When considering the level of improvement in EDE-Q scores that was more clinically valid, the optimum was a reduction of 1.13 on the Global score over the first four sessions, as suggested by Bell et al. (2017). People meeting this early change criterion were 2.5 times more likely to achieve remission at end of treatment. While an early reduction of 1.52 points on the EDE-Q Global score (Raykos et al., 2013) was equally predictive (again, indicating 2.5 time the chance of recovery), the reduction of 1.13 was more efficient, identifying more patients as rapid responders with no loss of prediction of outcome at the end of therapy.

The limitations of this study suggest future directions of research. First, the samples in this study included some patients with anorexia nervosa, but future studies should consider whether this level of rapid response is an equally effective predictor of end-of-therapy outcome for underweight patients. In addition, consideration of a suitable definition of early change with more disorder-appropriate measures for patients with avoidant/restrictive food intake disorder is also required. Second, CBT is only one of the evidence-based therapies for eating disorders, and this conclusion should be tested for rapid response to other therapies. Furthermore, the studies here have not involved control groups, so it is not possible to determine whether there is a level of spontaneous recovery, and whether such unaided recovery is also predicted by levels of EDE-Q Global score change. This possibility should be considered in future randomised controlled trials of CBT-T and other therapies. Third, the sample size of the study is relatively small for this type of study. Larger sample size would allow exploration of alternative definitions of early response, together with the necessary cross- or external validation. Fourth, our early change odds ratio related to remission needs to be interpreted in the context of a multivariable analysis. Using this approach removes "noise in the data" allowing for more precise estimations of the contribution of each variable (early change, baseline symptom severity, impairment caused by symptoms, and negative emotion) to remission. Fifth, ED severity is accounted for in the inclusion of the baseline EDE-Q global score and impairment score in the multivariable analyses. Thus, the results apply across different levels of severity. However, we note that a closer look at the impact of different levels of severity would be a useful future direction of research. Finally, this study evaluates remission at the end of treatment without considering long-term maintenance or relapse rates, leaving questions about the durability of remission. Further research needs to consider a longer time frame to verify the validity of our conclusions regarding positive outcomes in patients with eating disorders.

5. Conclusion

These findings can be used to inform clinicians of the degree of early change that is needed to predict positive outcomes in brief CBT for eating disorders. Clinical training, case supervision and routine progress monitoring can be used to encourage those clinicians to adopt therapeutic methods that maximise the level of early change, such as use of inhibitory learning methods (e.g., Waller et al., 2019). However, it must be acknowledged that no therapy will serve all patients equally, and that pushing for early change is only part of the process of enhancing therapy for eating disorders. Where there is inadequate early change to ensure that an existing CBT protocol is likely to produce remission, collaborative consideration of barriers to progress is required to identify suitable approaches to treatment augmentation (e.g., Wade et al., 2024), which can produce small but significant improvement in outcomes (Pennesi et al., 2024). Consideration of barriers may also lead to recommending more intensive therapy options (e.g., Chen et al., 2017), given the pervasive influence of inadequate nutrition on comorbidity and cognitive function (Jacka, 2017).

CRediT authorship contribution statement

Tracey D. Wade: Writing – original draft, Supervision, Funding acquisition, Formal analysis, Conceptualization. **Neophytos Georgiou:** Writing – review & editing, Investigation. **Ella Keegan:** Writing – review & editing, Project administration, Data curation. **Mia L. Pellizzer:** Writing – review & editing, Project administration, Data curation. **Glenn Waller:** Writing – original draft, Supervision.

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Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Tracey Wade and Glenn Waller are co-authors of the published treatment manual for one of the treatments featured in the paper.

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Data availability

The data that support the findings of this study are available at https://osf.io/hcqrk/

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