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Transdiagnostic single-session interventions identify rapid versus gradual responders and inform therapy personalisation before commencing therapy for eating disorders

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ABSTRACT

Rapid response to psychological therapy for eating disorders (EDs) is the most robust predictor of good outcomes. However, no research has identified predictors of early response *before* treatment commences. We address this gap with a proof-of-protocol study in 61 non-underweight adults. We used response to one of the three single-session interventions in the 2-week period between assessment and treatment to classify people as rapid or gradual responders (respectively, $\geq 30\%$ or $< 30\%$ decrease in dietary restraint) and stratified them to 10 sessions of lower- (guided online Cognitive Behaviour Therapy [CBT]) or higher-intensity treatment (face-to-face 10-session CBT [CBT-T]), respectively. Thirty patients (49%; no difference between SSIs) were classified as rapid responders in terms of dietary restraint. There was no difference in ED psychopathology between rapid and gradual responders at assessment, but rapid responders had significantly lower levels than gradual responders at pre-treatment (Hedge's $g = 1.16$ [0.62–1.70]), and session 4 ($g = 0.69$ [0.18–1.20]). There were no significant between-group differences at the end of the treatment or 1-month follow-up, with a significant decrease over time ($g = 2.42$ [1.48–3.37]). Rapid and gradual responders (defined by changes in dietary restraint) can be identified before treatment commences and stratified to an appropriate intensity of treatment, removing differences in treatment outcomes.

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Rapid responder; gradual responder; stratified; single-session intervention; treatment outcome

This proof-of-principle randomised trial investigates whether there are pre-treatment indices of which patients are likely to respond rapidly in the early part of therapy. It examines the impact of three different transdiagnostic single-session interventions (SSI), administered in a 2-week period between initial assessment and the start of cognitive behaviour therapy (CBT) for non-underweight patients seeking treatment for an eating disorder.

Two strands of evidence inform the current investigation. First, rapid response in psychological therapy for depression, anxiety and eating disorders predicts significantly better outcomes at the end of treatment and the follow-up (Beard & Delgadillo, 2019; Vall & Wade, 2015). It is the most robust and reliable predictor of outcome in eating disorders, above comorbidity, severity of eating psychopathology, therapeutic alliance and duration of the eating disorder (Radunz et al., 2020; Vall & Wade, 2015). Approximately half of patients across clinical eating disorder samples show a rapid response to psychological therapy (Chang et al., 2021), most often defined as reliable symptomatic improvement during the first four sessions, with a significant and moderate association between early response and post-treatment outcomes (Chang et al., 2021).

Second, individualisation (stratification) of psychological treatment, through matching the client's attributes to the most appropriate treatment, produces significantly better outcomes than predetermined stepped care (Delgadillo et al., 2022). In eating disorders, personalisation of treatment for gradual responders has been evaluated across only five studies, where limited early change in therapy is used to guide greater intensification of therapy to improve outcomes for such patients (Edney & Pellizzer, 2024). For example, Chen et al. (2017) showed that moving gradual responders from guided self-help for eating disorders characterised by binge-eating to more intensive therapy resulted in comparable end-of-treatment

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and follow-up outcomes to those of the rapid responders. Two studies of family-based treatment for adolescent anorexia nervosa (Le Grange et al., 2021; Lock et al., 2015) showed that booster sessions or extensions of treatment resulted in gradual responders having commensurate outcomes to rapid responders.

However, to date, no research has differentiated rapid and gradual responders *before* treatment for an eating disorder starts, which would allow us to match patients to the most appropriate treatment intensity before they commence treatment. Such early identification could produce greater efficiency in treatment provision, minimising frustration and feelings of failure once treatment commences.

In the current investigation, we examined the utility of three different SSIs administered before therapy commenced for identifying rapid and gradual responders (defined by changes in dietary restraint) to inform stratification of treatment, and the impact on outcome at the end of treatment and the 1-month follow-up. We chose reduction in dietary restriction over the waitlist period as an indicator of rapid or gradual response, given that it is the first target of cognitive behaviour therapy for eating disorders (CBT-ED). First, we hypothesised that the two SSIs supplemented with nutritional information (behavioural activation; growth mindset) would produce significantly more rapid responders over a waitlist period before participants received CBT-ED, compared to the non-suicidal self-injury SSI with no nutritional information. Second, we hypothesised that those people who were classified as gradual responders and who accordingly received a more intensive form of CBT-ED, face-to-face 10-session CBT (CBT-T; Waller et al., 2019), would benefit commensurately across our outcomes to those classified as rapid responders who received the less intensive version of CBT-ED, online guided self-help (CBT-GSH).

Method

Participants

All study procedures were approved by the Social and Behavioural Research Ethics Committee at Flinders University (Project # 5857). The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. The issue of possible early ending of therapy was addressed in this ethical application (see the rationale presented below).

The sample consisted of consecutive referrals to the Flinders University Services for Eating Disorders (FUSED) between January 2023 and August 2024 inclusive. Eligibility criteria included: being ≥ 15 years old, having a body mass index ≥ 18.5 , having a DSM-5 eating disorder, and being willing for the therapist to communicate with the general practitioner. Participants were ineligible if they had a severe psychiatric condition that would interfere with treatment (e.g. intense suicidality, active psychosis, current substance dependence), if they were already receiving therapy for an eating disorder, or if they had difficulty speaking or understanding English. No payment was received by any participant.

The mean age of the 61 participants was 27.99 years ($SD = 10.05$; range = 16–54 years); 57 (93%) were female, 3 were male and 1 was transgender. The most common diagnosis was Other Specified Feeding and Eating Disorder (OSFED; $n = 32$, 52%) which included 11 people with atypical anorexia nervosa. The next most common diagnosis was bulimia nervosa ($n = 28$, 46%), and one person had an unspecified FED. The mean duration of the eating disorder was 12 years ($SD = 11.38$; range = 1–40 years). The majority (82%) identified as white. Eight (13%) were still at school, 10 (16%) had left school before completing the final year, 25 (41%) had a certificate/diploma, and 18 (30%) had a university degree. Fifteen (25%) classified themselves as students, two had home duties (3%), six were unemployed (10%), 26 had casual or part-time employment (42%), and 12 (20%) were full-time employed. While 48% of the people reported having no self-harm plans in the future, 52% said that they were a “little bit” to “extremely likely” to purposefully hurt themselves without wanting to die in the future.

Design

The flow of participants through the trial is shown in Figure 1. Assessments were conducted online (via Qualtrics) at 5 time points: baseline (T1), 2-weeks post-baseline just before treatment commencement (T2),

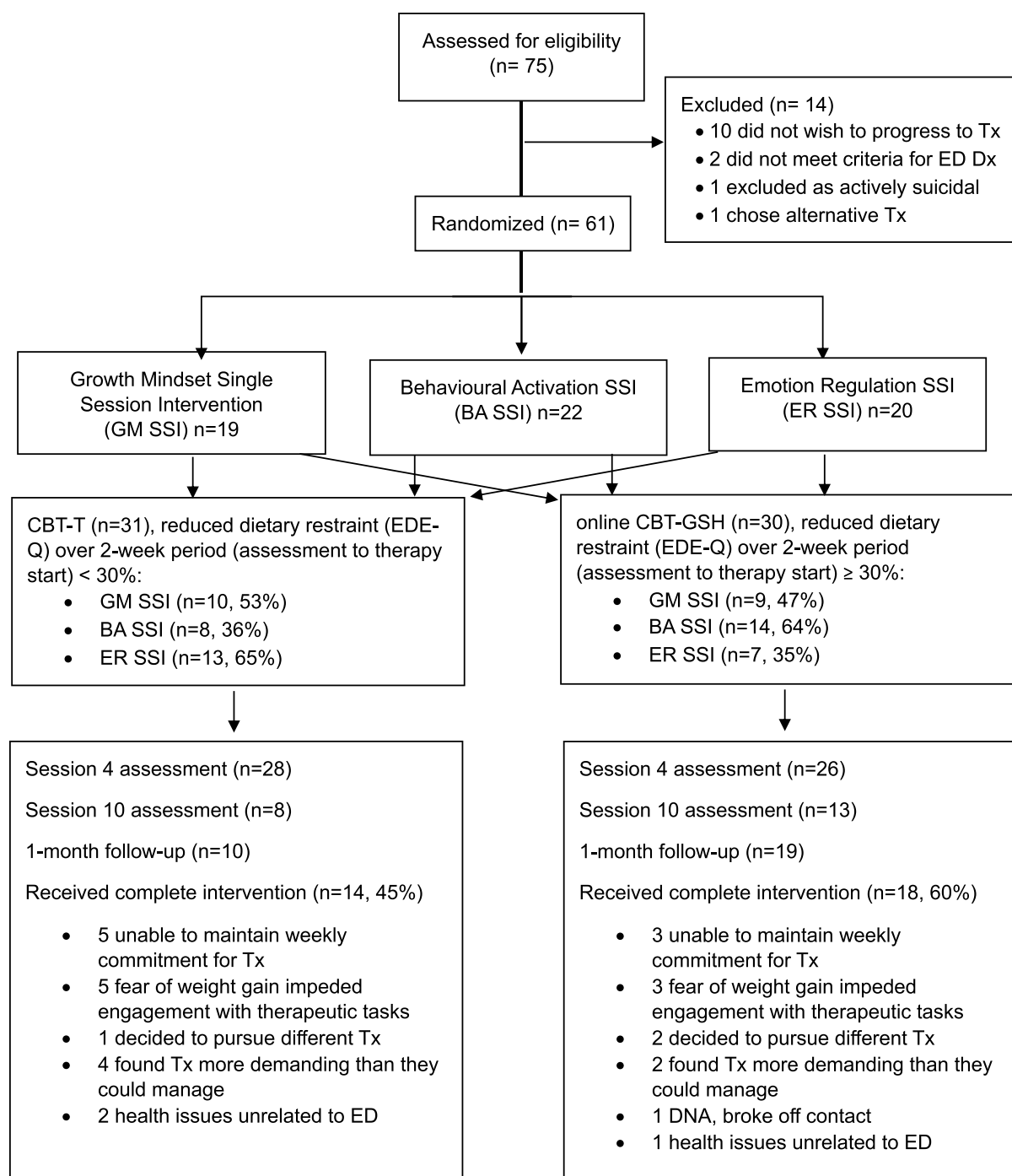


Figure 1. CONSORT flow diagram.

at session 4 (T3), at session 10 which was the end of treatment (T4), and at 1-month post-end of treatment (T5).

At assessment, all participants are told by the therapist: "I will be asking for changes from the get-go. We know the evidence tells us that people who don't make changes early in therapy usually don't have a good outcome of therapy. For this reason, we will review progress in session 4 to 6, and if there has not been a substantial improvement in your eating at this time, we will be unlikely to proceed with the remainder of the therapy as this would not be a good use of your time. We will discuss other options. The sorts of changes we look for are a decrease in dietary restriction, cessation of purging behaviours, and a decrease in any binge eating." The possible ethical issue of ending therapy early if it is not working is thus addressed, as alternative

treatments are considered if CBT-T is not effective and a more suitable option can be identified, thus ensuring that the patient is not kept in a therapy that has little chance of helping them. If the issue is that the patient is not ready to engage with any therapy at this point, then medical monitoring is arranged, and the patient is told that they are welcome to return to CBT-T or another therapy when they feel ready to engage. Participants were given their allocated SSI and asked to complete this over the following 2-week period before the first session of treatment.

Definition of early response and subsequent stratification

Participants who decreased dietary restriction $\geq 30\%$ at the end of the 2-week waitlist (i.e. between T1 and T2) were labelled rapid responders. They were allocated to an online-guided 10-session CBT-ED delivered weekly with therapist contact for 50 minutes each week (CBT-GSH). The remainder were labelled gradual responders and were allocated face-to-face 10-session CBT-T, offered weekly for 50 minutes each session. Both therapies were offered by trainee clinical psychologists under expert supervision. They have been described and evaluated previously, showing an effect size decrease in eating psychopathology of -2.18 (Cohen's d) across the two treatments (Wade et al., 2021). A meta-analysis of CBT-T trials reported a mean effect size decrease of -1.40 (Keegan et al., 2022).

No previous research has used changes in dietary restrictions as an indicator of rapid response. Two studies, however, have shown single-behaviour indicators, a reduction of binge eating between 10% and 15% in the first week, predicted binge remission at the end of treatment (Hilbert et al., 2019; Zunker et al., 2010). Dietary restriction was chosen as a brief transdiagnostic single indicator as it was expected to be common across diagnoses, and it is also the initial treatment target in CBT, therefore most relevant to rapid response. In a previous randomised controlled trial (RCT), we saw a 50% drop in restraint by session 4 of face-to-face therapy (Wade et al., 2021). In another RCT, where participants were supplied with an SSI between assessment and the start of treatment, we only saw a reduction in dietary restriction of only 8% (Keegan et al., 2024). Hence, we decided *a priori* that a drop of 30% was ambitious and could represent an early response but was not unrealistic.

Power

Based on a meta-analysis of outcomes for rapid and gradual responders who receive “combined” therapy (e.g. pharmacotherapy, dietetics, etc., in addition to psychotherapy) for an eating disorder, the expected between-group effect size at each time point was specified as 0.51 (Chang et al., 2021). Our sample was considered “combined” given that many had consulted a dietitian immediately before and during therapy and 15 (25%) were currently prescribed pharmacotherapy related to the eating disorder. Given the robust support of this effect across many studies, we used a one-sided alpha level (.05). Based on a power of 0.80, assuming a correlation of 0.50 between baseline and follow-up assessments and a 50% split between the rapid and gradual responder groups (Chang et al., 2021), a total of 29 people were required in each group, total $N = 58$ (Hedeker et al., 1999).

Single-session interventions

In a previous clinical trial conducted at FUSED, Keegan et al. (2024) showed no impact of two different SSIs (psychoeducation handout vs brief cognitive remediation intervention) on decreasing dietary restrictions before treatment commencement. We have therefore reconceptualised our construction of the three SSIs utilised in the current investigation, based on those originally developed and evaluated by Jessica Schleider and colleagues: ABC Project, targeting depression through behavioural activation (Schleider et al., 2022); Project Personality, using psychoeducation about growth mindset (Schleider et al., 2022); and Project SAVE, targeting non-suicidal self-injury (Dobias et al., 2021). They incorporate four elements reflected in the BEST acronym (Schleider et al., 2020). First, brain science (B) is used to normalise concepts and enhance message credibility. Psychoeducation about the importance of nutrition to neuroplasticity and helpful epigenetic action results in significantly decreased levels of disordered eating and body image disturbance in emerging adults with elevated weight concerns (Zhou et al., 2020). Second, empowering (E) participants

as experts rather than passive recipients of treatment is used. Third, the “saying is believing effect” (S) is exploited to internalise the intervention’s message, given the impact of motivational enhancement techniques using change talk that produce better outcomes (Magill et al., 2018). Fourth, evidence and testimonials (T) from valued others are used, as they increase the persuasiveness of mental health messaging (Johnson et al., 2017).

Two of the three SSIs (behavioural activation and growth mindset) included a rationale for decreasing dietary restriction and improving nutritional intake in terms of brain and emotional health that was linked to the information in the SSI. The behavioural activation SSI contained about double the content on nutrition than the growth mindset SSI, around 1.5/15 pages and 0.5/11 pages, respectively. There was no content on nutrition in the non-suicidal self-injury SSI.

Participants were asked to spend up to 1 hour completing the SSI at the beginning of the 2-week period between assessment and the first session of therapy. Compliance was assessed using one question at T2: “Of the module you were given to work on between the assessment and now, how much of it have you read?” using a sliding scale from 0 to 100. The SSIs are described as transdiagnostic because they have an impact on symptomatology across different diagnostic indicators (Dobias et al., 2021; Schleider et al., 2022).

Behavioural activation

The behavioural activation SSI (BA-SSI; Schleider et al., 2022) includes five elements: (1) an introduction to the rationale (i.e. engaging in values-based activities that build pleasure and accomplishment can combat sad mood and low self-esteem); (2) psychoeducation about depression, including how behaviour shapes feelings and thoughts; (3) identification of key areas of life from which the person draws (or once drew) enjoyment and meaning; (4) the creation of an activity action plan, where the person identifies (from pre-generated lists) and personalises (in guided exercises) three activities to target for change; and (5) writing about benefits that might result from engaging in each activity, an obstacle that might keep them from doing the activities and a strategy for overcoming the identified obstacles. We focused on four actions that can improve mood: (1) Connecting with people who make you feel good; (2) Achieving goals that matter to you; (3) Enjoying activities on your own; (4) Feeding your brain.

Growth mindset

The growth mindset SSI (GM-SSI; Schleider et al., 2022) contains information about how we can shape our thoughts and feelings by changing our behaviours and the connections in our brains and the importance of nutrition in allowing the brain to adapt. It includes five elements: (1) an introduction to the brain and a lesson on neuroplasticity; (2) testimonials from peers who describe their views that traits are malleable, due to the brain’s plasticity; (3) further stories by peers, describing times when they used “growth mindsets” to persevere during social or emotional setbacks; (4) study summaries noting how and why personality can change; and (5) an exercise in which the participant gives advice to a younger person, using scientific information to explain people’s capacity for change. Both the behavioural activation and growth mindset of SSIs reduce depression, hopelessness and restrictive eating in adolescents experiencing depression (Schleider et al., 2022).

Non suicidal self-injury

The non-suicidal self-injury SSI (NSSI-SSI; Dobias et al., 2021) presents techniques for ceasing self-harming behaviours informed by CBT. It has four general content sections: first, explaining the science behind how decreasing self-injurious behaviours can positively impact thoughts and emotions over time; second, detailing scientific evidence and testimonials from peers who have decreased their self-injurious behaviours and noticed positive change as a result; third, providing evidence-based tips and alternative coping mechanisms to replace self-harming behaviour; and fourth, offering an opportunity for people to share their own thoughts and advice on what they have learned with peers who are facing similar challenges. It has been shown to decrease self-hatred and desire to stop future non-suicidal self-injury at and post-intervention and to decrease suicidal ideation at follow-up (Dobias et al., 2021).

The SSI materials for Growth Mindset and Behavioural Activation are available at <https://osf.io/xpqa8/>, and we used the non-suicidal self-injury SSI created and tested by Dobias et al. (2021) modified for an older age group with eating disorders; see <https://osf.io/vguf4/>.

Measures

Baseline demographics

Demographic information included age, ethnicity, level of education and work status, age of onset and duration of eating disorder. In addition, information about the following variables was reported at each of the time points.

Primary outcome: disordered eating

The Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 2008) was our primary measure of disordered eating. The total or global score comprises four subscales: dietary restriction, concern about weight, shape, and eating. Higher scores indicate more disturbance. The EDE-Q has good convergence with the interview version (Berg et al., 2012). Internal reliability (McDonald's Ω) was, respectively, .89 (22 items), .80 (5 items), .59 (5 items), .87 (8 items) and .68 (5 items). The dietary restriction subscale was used to determine responder status, but we used the global score as our primary outcome. We note that the EDE-Q global is widely reported but is considered problematic in terms of reliable factor structure, with a 7-item version being the only form to have robust fit in confirmatory factor analyses, good internal consistency, and measurement invariance by sex, self-identified gender, and overweight status (Jenkins & Davey, 2020; Machado et al., 2020). This 7-item version contains 3 of the 5 items from the dietary restriction subscale.

ED-15 (Tatham et al., 2015) was used as a briefer sessional indicator of shape and weight concern during the treatment phase. Higher scores indicate more pathology. ED-15 has good validity and reliability in clinical samples (Zhou et al., 2024). Internal reliability was .87 (10 items).

Body image acceptance

The ability to accept and experience thoughts and feelings about one's body was assessed with the 12-item Body Image-Acceptance and Action Questionnaire (Sandoz et al., 2013) that has good reliability and discrimination between community and clinical samples (Pellizzer et al., 2018). Lower scores indicate lower pathology. Internal reliability was .85.

Self-criticism

The 10-item Self-Critical Rumination Scale (Smart et al., 2016) was utilised, with higher scores indicating greater self-criticism. Items were developed with community and clinical samples and show good convergent plus unique predictive validity with psychological distress (Smart et al., 2016). Internal reliability was .91. Perfectionism is a key mechanism identified as a maintaining factor of disordered eating in the transdiagnostic theory underpinning CBT (Fairburn et al., 2003), and self-criticism is postulated to be the active harmful ingredient of perfectionism (Dunkley et al., 2016).

Mood

Mood was assessed using the 21-item Depression, Anxiety and Stress Scale (Lovibond & Lovibond, 1995). Higher scores reflect worse mental health. Sound internal, concurrent and discriminative reliability has been demonstrated in community and clinical samples (Antony et al., 1998). Internal reliability (McDonald's Ω) was, respectively, .94, .88 and .86.

Impairment

The 16-item Clinical Impairment Assessment (Bohn et al., 2008) measures the impact of ED pathology. Higher scores indicate lower psychosocial function. With good internal consistency, test-retest reliability, and discriminant validity, the measure has been used in community and clinical populations (Bohn et al., 2008). Internal reliability was .92.

Quality of life

This was measured with the 20-item Recovering Quality of Life Questionnaire, which showed good discriminant validity, sensitivity to change and absence of ceiling or floor effects (Keetharuth et al., 2018). Higher scores indicate a better quality of life. Internal reliability was .90.

Analyses

Logistic regression was used to examine baseline predictors of treatment completion, defined as completing all 10 treatment sessions (unless an earlier finish was agreed upon as treatment had met the targets outlined above). Participants completing fewer than 10 sessions without a collaborative agreement with their therapist were defined as dropouts. Linear mixed model (LMM) analyses were used to examine changes in continuous treatment outcomes over time between waitlist conditions. LMM analyses assume that data are missing at random and retain all participants even if they are missing data at different time points. Bonferroni corrections were applied for all comparisons. Within-group effect sizes were calculated as Cohen's d and were adjusted for the correlation between observations.

Results

Treatment completion

There were no significant baseline differences between those who completed treatment and those who did not with respect to responder status, age, duration of the eating disorder and the outcome variables. While there was no difference for the global EDE-Q score, participants who did not complete treatment had significantly higher levels of dietary restriction at baseline (OR 1.44, 95% CI: 1.01–2.03) than those who did, with respective mean (SD) values of 4.23 (1.48) and 3.36 (1.65).

Comparison of the SSIs in reducing dietary restriction before therapy commencement

There was no difference between the mean (SD) percentage of each SSI read, as reported by participants: 66.5% (35.60) for the GM-SSI, 79.55 (36.93) for BA-SSI, and 88.74 (21.55) for NSSI-SSI, $F(2,56) = 2.20$, $p = .12$. Each of the three SSIs was associated with a significant decrease in dietary restriction between assessment and commencement of therapy, though there was no significant difference between the three conditions. Participants in the GM-SSI decreased by 0.78 points, from an adjusted mean (SE) of 3.28 (0.37) to 2.51 (0.41), $p = .02$. Participants in the BA-SSI decreased by 1.56 points, from an adjusted mean (SE) of 3.86 (0.34) to 2.30 (0.38), $p < .001$. Participants in the NSSI-SSI decreased by 1.21 points, from an adjusted mean (SE) of 4.16 (0.36) to 2.95 (0.40), $p < .001$.

The proportion of participants classified as rapid responders in each SSI (defined by changes in dietary restraint) was 47%, 64% and 35%, respectively. Using our hypothesised “control” NSSI-SSI as the comparator, there was no difference from either the GM-SSI (Hedge's $g = 0.15$, 95% CI: -1.22 to 1.41) or the BA-SSI (0.42: -0.72 to 1.55), using the logit method. In total, 30 (49%) participants were classified as rapid responders and assigned to CBT-GSH, and 31 (51%) participants were classified as gradual responders and assigned to CBT-T.

Comparison of rapid and gradual responders over therapy

There were no baseline demographic differences between the rapid and gradual responders (changes in dietary restraint). The changes over time across variables are reported in Table 1. Across all variables, there were no differences between groups at baseline assessment (T1). Except for anxiety and stress, there were significant differences between the two groups at pre-treatment (T2), favouring the rapid responders (i.e. those who went on to receive CBT-GSH). The significant between-group effect sizes ranged from moderate (0.54) to large (1.22). Six variables retained significant differences between groups at session 4 of treatment (T3), including weight concerns, shape concerns, eating concerns, ED-15 shape and weight concern, and body image acceptance. There were no differences across any of the variables between the two groups at the end of treatment (T4), or 1-month follow-up (T5). A graphic display of trajectory is illustrated in Figure 2 with the global EDE-Q scores, showing an overall decrease (regardless of group) of 2.42 (Hedge's g adjusted for correlation; 95% CI: 1.48 to 3.37) over treatment and follow-up.

An overall decrease over the treatment of the frequency of eating disorder behaviours each week reported (ED-15) was also evident; objective binge episodes from 4.81 (SD = 10.88) to 0.19 (0.40); self-induced vomiting episodes from 4.14 (11.08) to 0.10 (0.30). The N days behaviours were used also decreased; laxative

Table 1. Change over time (ITT)—unshaded rows indicate gradual responders ($n = 31$) and shaded indicate rapid responders ($n = 30$)- adjusted means and standard errors.

Variable	Assessment T1	Pre-Tx T2	Session 4 T3	Session 10 T4	1-month FU T5	Hedge's g between group ES (95% CI) T2
Dietary restraint ^{1,3}	3.86 (0.29)	3.50 (0.27) ^a	1.93 (0.27)	0.47 (0.15)	0.53 (0.16)	1.22 (0.68–1.76)
	3.70 (0.30)	1.63 (0.28) ^b	1.19 (0.28)	0.80 (0.14)	0.60 (0.15)	
Weight concern ^{1,3}	4.93 (0.15)	4.67 (0.23) ^a	4.01 (0.27) ^a	1.69 (0.33)	2.14 (0.37)	0.95 (0.43–1.47)
	4.65 (0.15)	3.45 (0.23) ^b	2.77 (0.27) ^b	2.31 (0.30)	1.93 (0.31)	
Shape concern ^{1,3}	5.38 (0.16)	5.11 (0.23) ^a	4.63 (0.28) ^a	2.22 (0.39)	2.40 (0.39)	0.93 (0.41–1.45)
	5.15 (0.16)	3.92 (0.23) ^b	3.58 (0.28) ^b	2.87 (0.35)	2.46 (0.35)	
Eating concern ^{1,3}	4.02 (0.20)	3.79 (0.21) ^a	3.17 (0.27) ^a	1.10 (0.25)	1.20 (0.27)	0.89 (0.37–1.41)
	3.81 (0.20)	2.75 (0.21) ^b	2.29 (0.28) ^b	1.36 (0.22)	1.07 (0.24)	
EDE global score ^{1,3}	4.55 (0.17)	4.27 (0.20) ^a	3.43 (0.25) ^a	1.36 (0.24)	1.62 (0.27)	1.16 (0.62–1.70)
	4.33 (0.17)	2.94 (0.21) ^b	2.46 (0.25) ^b	1.83 (0.22)	1.51 (0.24)	
ED15 shape and weight concern ^{1,3}	4.67 (0.16)	4.35 (0.23) ^a	3.81 (0.25) ^a	1.47 (0.28)	1.78 (0.33)	0.73 (0.21–1.24)
	4.47 (0.17)	3.42 (0.23) ^b	2.89 (0.26) ^b	1.93 (0.26)	1.81 (0.29)	
Impairment due to eating ^{1,3}	2.02 (0.11)	2.00 (0.12) ^a	1.65 (0.14)	0.82 (0.13)	0.88 (0.18)	0.61 (0.10–1.12)
	2.04 (0.11)	1.59 (0.12) ^b	1.33 (0.14)	0.86 (0.12)	0.83 (0.17)	
Depression ^{1,3}	1.45 (0.15)	1.47 (0.13) ^a	1.22 (0.16)	0.72 (0.14)	0.81 (0.18)	0.54 (0.04–1.05)
	1.43 (0.15)	1.06 (0.14) ^b	0.99 (0.16)	0.78 (0.14)	0.76 (0.16)	
Anxiety ¹	1.18 (0.13)	1.19 (0.13)	0.99 (0.14)	0.65 (0.10)	0.63 (0.12)	0.41 (–0.09–0.91)
	1.14 (0.14)	0.89 (0.13)	0.84 (0.15)	0.53 (0.10)	0.49 (0.11)	
Stress ¹	1.78 (0.12)	1.65 (0.11)	1.49 (0.13)	1.14 (0.10)	1.18 (0.15)	0.36 (–0.14–0.86)
	1.54 (0.12)	1.43 (0.11)	1.29 (0.13)	0.96 (0.09)	0.90 (0.13)	
Quality of Life ^{1,3}	1.54 (0.12)	1.55 (0.11) ^a	1.80 (0.14)	2.58 (0.16)	2.52 (0.19)	0.68 (0.17–1.19)
	1.71 (0.12)	1.99 (0.12) ^b	2.12 (0.14)	2.38 (0.15)	2.47 (0.17)	
Body image acceptance ^{1,3}	5.69 (0.17)	5.69 (0.18) ^a	5.52 (0.21) ^a	3.89 (0.31)	3.60 (0.40)	0.56 (0.05–1.06)
	5.42 (0.17)	5.13 (0.18) ^b	4.86 (0.21) ^b	4.19 (0.28)	3.90 (0.36)	
Self-criticism ^{1,3}	3.56 (0.10)	3.50 (0.11) ^a	3.28 (0.13)	2.87 (0.16)	2.55 (0.18)	0.72 (0.20–1.23)
	3.28 (0.11)	3.06 (0.11) ^b	2.92 (0.14)	2.50 (0.15)	2.48 (0.16)	

Note: Superscripts indicate significant: ¹ main effect of time; ² main effect of treatment; ³ time $\times$ treatment interaction; Superscripts ^a ^b indicate significant difference between the two groups at this time point.

abuse from 1.14 (2.35) to 0.24 (0.77); dietary restriction from 4.19 (2.73) to 0.10 (0.44); excessive exercise was eliminated by the end of treatment from a mean (SD) of 1.52 (2.06) days per week.

The rapid responders allocated to CBT-GSH were more likely to complete treatment compared to the gradual responders in CBT-T, 60% vs 45%, OR = 1.83, but this was not a significant difference (95% CI: 0.62–5.41). There was no difference in the N sessions received between these two groups, a mean (SD) of 7.60 (2.96) and 6.97 (3.01), respectively.

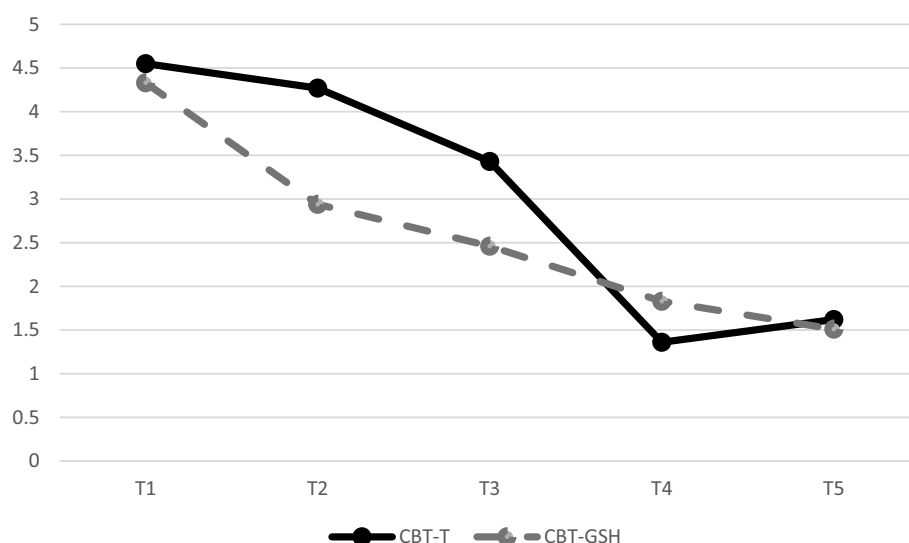


Figure 2. Change in global EDE-Q score over time, intent to treat analyses ($n = 61$). No differences between groups at T1 baseline ($p = .36$), T4 end of treatment ($p = .17$) or T5 1-month follow-up ($p = .77$) but significant group differences at T2 pre-treatment ($p < .001$) and T3 session 4 ($p = .008$).

Discussion

We investigated whether we could classify patients with eating disorders as rapid or gradual responders before treatment commenced. We then used this information to stratify them accordingly to lower- or higher-intensity treatments, respectively, to determine whether this treatment personalisation removed differences in treatment outcomes between the two groups. We assessed rapid response as a decrease in dietary restriction of 30% or more over the 2-week period between assessment and commencement of treatment, during which participants received one of the three single-session interventions (SSIs) designed along BEST principles (Schleider et al., 2020) to maximise change. We were able to classify around half of our participants as rapid responders. This proportion of rapid responders maps onto the results of a meta-analysis of early changes in treatment for eating disorders, showing that 54.4% achieved reliable symptomatic improvement during the first four sessions of therapy, with a significant association to better post-treatment outcomes than gradual responders (Chang et al., 2021). While other transdiagnostic interventions have been tested with eating disorders and could be used to indicate responder category, these tend to be of longer duration with some up to 10 sessions, e.g. Cognitive Remediation and Emotion Skills Training (Tchanturia et al., 2015).

Our first hypothesis was partially supported, showing that all the three SSIs were associated with a significant decrease in dietary restriction before treatment. Contrary to predictions, the addition of nutritional content did not produce significantly more rapid responders in the BA-SSI and GM-SSI groups compared to the NSSI-SSI group, despite the apparent tendency to a greater impact of the SSIs with higher levels of nutrition-related content (64% in the BA-SSI with most nutritional information; 47% in the GM-SSI with less content; 35% in the NSSI-SSI with no nutritional content). This non-significant set of differences indicates that a larger N is likely to be needed to determine whether there is a reliable link between the content of the SSIs and this specific outcome. Previous evaluation of the first two SSIs in adolescents experiencing depression has shown that, even with no nutritional content, restriction was decreased significantly, with a small effect size (Schleider et al., 2022).

This finding contrasts with our earlier work, comparing the use of two different SSIs (Brief Cognitive Remediation Therapy and psychoeducation) over a 1-month period to waitlist as usual (Keegan et al., 2024). None of these conditions were associated with a significant reduction in dietary restraint between assessment and commencement of therapy. The respective point decreases in dietary restriction were 0.24 ($p = .17$), 0.33 ($p = .07$), and 0.25 ($p = .17$) compared to between 0.78 and 1.56 in the current trial. This suggests that SSIs modelled on BEST principles

(Schleider et al., 2020), designed to maximise change, are worthwhile to further examine in adequately powered trials that can detect significant differences associated with small effect sizes between SSIs with differing amounts of nutritional content. In the current study, our SSI with the most nutritional content (behavioural activation) achieved almost double the number of rapid responders (64%) than our SSI with no nutritional content (35%). Such research should keep in mind the aim of keeping the nutritional content of the SSIs to a minimum and embedded in content of transdiagnostic relevance, to challenge any denial that interferes with help-seeking for problems related to eating (Radunz et al., 2023). Future research should include a waitlist to control SSI conditions and test mechanisms of change. We suggest that, while inclusion of information about nutrition increased impact, it may be that other transdiagnostic processes are also of relevance, such as improved emotion regulation via decreased rumination (Leppanen et al., 2022).

The second hypothesis was fully supported, showing that those people who were classified as gradual responders (based on lower pre-therapy changes in dietary restraint) and who received a more intensive CBT, face-to-face CBT-T, benefited commensurately to rapid responders who received the less intensive version of CBT in an online-guided self-help format. Focusing on eating pathology, the significant differences between groups at the second timepoint, immediately pre-treatment, were still apparent at session 4, but absent at the end of treatment and the 1-month follow-up. The overall improvement was robust with a very large effect size ($g = 2.42$), slightly higher than reported in our previous trial (Wade et al., 2021) and higher than the pooled mean reported across eight previous evaluations of CBT-T (Keegan et al., 2022). The early decrease of disordered eating (restrictive eating) in the rapid responder group before treatment commenced was mirrored across depression, quality of life, self-criticism, and impairment. In short, giving gradual responders a more intensive intervention allowed them to “catch-up” with rapid responders who had a less intensive intervention, by the end of treatment, supporting the personalisation of the intervention, based on pre-treatment response to a simple SSI.

The novel results of the current investigation need to be interpreted in the context of several limitations. As a proof-of-protocol study based on a sizeable literature showing consistent moderate differences between rapid and gradual responders over therapy, we used the more liberal one-sided significance testing in our power calculations. Replications of our findings are required in larger samples that can conclusively support the equivalence between rapid and gradual responder outcomes when suitably matched to therapies of appropriate intensity. It will also be important to consider the optimum measure to be used to test for these effects. As noted above, the full EDE-Q (Fairburn & Beglin, 2008) has psychometric limitations that might reduce its utility for detecting overall outcomes and changes in dietary restraint, as well as being relatively time-consuming to complete. We recommend considering the more psychometrically robust EDEQ-7 (Jenkins & Davey, 2020; Machado et al., 2020) for detecting changes in restraint over the waitlist period, as well as identifying early changes during therapy. It should also be noted that the use of dietary restraint as an index of rapid response before therapy is not the same as used in measures of early change in other studies, where reduction in bulimic behaviours and wider eating attitudes is more commonly used (e.g. Turner et al., 2016; Vall & Wade, 2015), thus making comparison to previous studies difficult. However, as detailed, we used the index of change in dietary restraint because it was more closely allied to the content of the SSIs that were used in this case. We argue that intervention-specific measures are the most meaningful to use. We also note that our sample was mainly white, female and not underweight, and therefore, these results cannot be extrapolated more widely. However, our sample was broadly representative of the proportion of gender and diagnosis observed in community cases of eating disorders (Silén et al., 2020) with a 7.46 female-to-male ratio (13 in the current study) and an OSFED-to-BN ratio of 1.88 (1.13 in the current study). Given the focus on dietary restriction and its relevance to people with anorexia nervosa, it would be of interest to investigate these relationships with that population, though this would need to be based on a protocol other than CBT-T, which is specific to non-underweight patients. Further, a better validated measure of compliance with SSIs should be considered, rather than simply asking how much of them had been completed, as used here. Finally, it would also be of interest to investigate the replicability of results outside of CBT given that the use of stratification has been found to benefit patients receiving a range of evidence-based psychotherapies including person-centred experiential counselling for depression and eye movement desensitisation and reprocessing for posttraumatic stress disorder (Delgadillo et al., 2022).

Given the robust decreases in disordered eating in a population with lengthy and complex eating disorders associated with comorbid psychopathology, this study increases our understanding of how to ensure commensurate treatment outcomes regardless of initial responder status. While the work of Delgadillo et al. (2022) in depression reported that stratified care was associated with a higher mean additional cost per patient (because more patients accessed high-intensity treatments), the additional cost resulted in an approximately 7% increase in the probability of a reliable and clinically significant improvement in depression symptoms. We suggest, likewise, that assessing responder status and stratifying people to treatment before treatment commences has the potential to improve treatment tolerability and outcomes for people with eating disorders.

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Disclosure statement

Waller and Wade receive royalties for the CBT-T therapist manual which represents one of the interventions evaluated in this report: Waller et al. (2019).

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Data availability statement

The data that support the findings of this study are openly available in the Open Science Framework at <https://osf.io/3edv8/>.

Open scholarship



This article has earned the Center for Open Science badges for Open Data and Open Materials through Open Practices Disclosure. The data and materials are openly accessible at <https://osf.io/3edv8/>

Trial registration

Our hypotheses were preregistered before we scored the data or conducted any analyses. Even though the trial was submitted to the Australian New Zealand Clinical Trials Registry before participants were recruited, it met criteria for retrospective registration as final approval was received in the same week as the first four participants were recruited (ACTRN12623000101684).

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