

# Assessing Negative Core Beliefs in Eating Disorders: Revision of the Eating Disorder Core Beliefs Questionnaire

Amaani H. Hatoum

The University of Sydney

Amy L Burton (✉ [amy.burton@sydney.edu.au](mailto:amy.burton@sydney.edu.au))

The University of Sydney <https://orcid.org/0000-0002-6641-6442>

Maree J Abbott

The University of Sydney

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## Research Article

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# Abstract

**Background:** Increased theoretical and empirical attention has been given to examining the role of core beliefs in both the development and maintenance of eating disorders (EDs). The Eating Disorder Core Beliefs Questionnaire (ED-CBQ) is self-report measure designed to assess five dimensions of core beliefs relating to eating disorders; self-loathing, unassertive/inhibited, demanding/needing help and support, abandoned/deprived, and high standards for the self. The present study aimed to evaluate the psychometric properties of the ED-CBQ and to develop a revised and improved version of the original measure, as necessary, after evaluating its factor structure and related properties.

**Methods:** A sample of undergraduate university students ( $N = 763$ ) completed an online test battery of questionnaires. Putative ED ( $n = 384$ ) and non-ED ( $n = 379$ ) subgroups were created from self-reported responses from the Eating Disorder Examination Questionnaire (EDEQ). Confirmatory factor analyses (CFAs) were performed, and internal consistency, construct validity, group differences and clinical utility was examined.

**Results:** An initial CFA did not support the original five-factor 40-item ED-CBQ. Two revised versions were developed that both possessed equal or superior psychometric properties to the original 40-item measure. The ED-CBQ-SF and ED-CBQ-R both demonstrated superior model fit, similar levels of reliability and construct validity, and the ability to discriminate between putative ED diagnostic groups.

**Conclusions:** Our results suggest that the ED-CBQ-SF and ED-CBQ-R are both valid, reliable, but more importantly efficient and accessible measures with the potential to be utilised both clinically and in research settings.

## Plain English Summary

In this study, we evaluated and revised the Eating Disorder Core Beliefs Questionnaire (ED-CBQ); a measure designed to assess five areas of core beliefs hypothesised to be relevant to the development and maintenance of a variety of eating disorder presentations. The present study aimed to evaluate the ED-CBQ and to develop a revised and improved version of the original measure, as necessary, after evaluating its factor structure and related properties. We did not find support for the original ED-CBQ, and as such, two revised versions were developed that both possessed equal or superior properties to the original 40-item measure. The revised ED-CBQ-SF and ED-CBQ-R were able to differentiate between eating disorder and non-eating disorder groups, and importantly, are valid, reliable and efficient tools for future clinicians and researchers. These new tools may prove useful in future research when considering the core cognitive features underlying a variety of disordered eating and feeding presentations.

## Introduction

In recent decades, the impact and prevalence of eating disorders (EDs) has increased significantly worldwide (Coffino et al., 2019; Galmiche et al., 2019; Mitchison et al., 2017). EDs have been associated with increased risk for physical health conditions, including obesity as well as increased psychological distress, role impairment, and have a greater negative impact on personal relationships (Hudson et al., 2006; Kessler et al., 2007; Mustelin et al., 2017). Therefore, as a public health concern, it is essential to treat and manage both clinical and subclinical disordered eating behaviours. Established ED treatments would benefit from an increased understanding of the varied factors contributing to the aetiology and maintenance EDs (Waller et al., 2007).

Increased theoretical and empirical attention has been focused on examining the role of negative core beliefs in both the development and maintenance of EDs (Cooper et al., 2004; Fairburn et al., 2003; Jones et al., 2007; Waller et al., 2007). Core beliefs, conceptualised as unconditional schema-level representations, play a key role in maintaining cognitive, affective and behavioural symptoms of EDs (Beck et al., 1990; Waller 2003; Young et al., 2003). Indeed, Fairburn et al.'s (2003) transdiagnostic model hypothesised that core low self-esteem is a key factor maintaining over-evaluation of eating, shape and weight and over-evaluation of achieving perfectionism across EDs and eating disorders not otherwise specified (EDNOS). Waller's (2004) schema-focussed cognitive-behavioural therapy (SFCBT) model of eating disorders predicts that the avoidance of negative affect generated by core beliefs (via the process of schema compensation) facilitates the development of restrictive pathology such that core beliefs triggering affect avoidance contribute to the development of bulimic pathology (Waller, 2004). Similarly, global negative self-beliefs have been proposed to be the main predisposing factor in the cognitive model of bulimia nervosa (BN) (Cooper et al., 2004), and core low self-esteem the primary underlying predisposing factor for binge eating (Burton & Abbott, 2019). However, existing models have not as yet attempted to differentiate or outline which specific themes or dimensions of core beliefs may predispose individuals to, or maintain, ED presentations.

Empirical evidence has supported the idea that maladaptive core beliefs relating to EDs are a transdiagnostic factor contributing to increased vulnerability for developing eating psychopathology (Vervaet et al., 2021), particularly binge eating, purging, and restriction (Jones et al., 2007; Pugh, 2015). Negative self-beliefs have been shown to predict binge eating in both clinical (Bergin & Wade, 2012) and community samples (Young & Cooper, 2013). More specifically, both binge eating and purging behaviours have been associated with dependence, defectiveness, self-loathing, abandonment, emotional inhibition and deprivation, failure to achieve, insufficient self-control and social isolation core beliefs (Aloi et al., 2020; Jones et al., 2007; Pauwels et al., 2016; Pugh, 2015). Similarly, restrictive pathology has been linked to unrelenting standards, failure to achieve, and social undesirability schemas (Pauwels et al., 2016), as well as dependence/incompetence, emotional inhibition and abandonment core beliefs (Jones et al., 2007; Pugh, 2015).

Clearly it is fundamental that treatments also target the schematic level of processing (Waller et al., 2007). Targeting core beliefs in specific ED focused treatment should be assessed for effectiveness in both research and clinical settings (Burton & Abbott, 2017). It is therefore essential to have measures of core ED beliefs that are valid, reliable, and accessible, for improving research quality and clinical utility.

A limited number of questionnaires have been developed to adequately measure these beliefs. Perhaps the most widely known is the Young Schema Questionnaire (YSQ; Young & Brown, 1994), and subsequent short-form versions, which have been extensively used to examine the presence of early maladaptive schemas (e.g., abandonment, emotional inhibition and deprivation). Each of the 16 YSQ subscales has demonstrated validity, reliability and clinical utility with the ability to differentiate between individuals with binge eating disorder (BED) and BN from non-clinical individuals (Waller et al., 2000; 2001). However, the YSQ was not developed to capture core beliefs that specifically relate to ED presentations (Fairchild & Cooper, 2010).

The Eating Disorder Beliefs Questionnaire (EDBQ; Cooper et al., 1997) was created to specifically assess three dimensions of assumptions (conditional beliefs) and one of core beliefs (unconditional beliefs) related to eating disorders; 1) weight and shape as a means for self-acceptance, 2) weight and shape as a means for acceptance by others, 3) control overeating, and 4) negative self-beliefs. The negative self-beliefs subscale contains items intended to assess negative core beliefs relating to feelings of inadequacy and defectiveness (e.g., 'I'm stupid', 'I'm a

failure', 'I'm unlovable'). The EDBQ has been validated both in adolescents in the UK (Rose et al., 2006) and adolescent females in Iran (Zeinab & Vafae, 2009), and in a mixed clinical and non-clinical population of Australian adults (Bergin & Wade, 2014). Studies demonstrated that the EDBQ has good internal consistency, convergent validity and adequate test re-test reliability (Bergin & Wade, 2014; Rose et al., 2006; Zeinab & Vafae, 2009). Moreover, its factor structure has been replicated and it has been able to distinguish between ED and control participants (Bergin & Wade, 2014; Rose et al., 2006; Zeinab & Vafae, 2009). However, despite displaying good psychometric properties and having discriminatory value, it does not capture the full range of themes that have been identified to be relevant to individuals with disordered eating (Fairchild & Cooper, 2010). The most prominent of these is the concept of self-loathing and self-disgust, which has been identified as a theoretically important construct in binge eating (Burton & Abbott, 2019).

The Eating Disorder Core Beliefs Questionnaire (ED-CBQ; Fairchild & Cooper, 2010) was developed in response to previous measures failing to assess several important core belief constructs. Using both previous theoretical and empirical literature (Somerville & Cooper, 2007; Woolrich et al., 2006), the authors identified several additional and ED specific themes that were not adequately captured by the EDBQ, including defectiveness, rejection, isolation, abandonment, setting of extremely high standards, lack of self-control, and weakness (Fairchild & Cooper, 2010). The ED-CBQ authors also considered that the concepts of self-loathing and self-disgust were particularly important and warranted inclusion in assessing eating disorder relevant core beliefs. Initial items then were selected that were considered characteristic of EDs based on a combination of theoretical judgement, clinical experience and qualitative data (Fairchild & Cooper, 2010).

The final 40-item ED-CBQ was developed using an exploratory factor analysis using items across these themes. It assesses five dimensions of core beliefs: 1) self-loathing (e.g., 'putrid'), 2) unassertive/inhibited (e.g., 'submissive'), 3) demanding and needing help and support (e.g., 'needy'), 4) abandoned/deprived (e.g., 'abandoned') and 5) high standards for self (e.g., 'focused'). Subscales exhibited adequate internal consistency ( $\alpha$ 's ranged from .76 to .96). Apart from the high standards for self subscale, all other subscales demonstrated good convergent validity, as indicated by significant correlations with the Eating Attitudes Test 26 (EAT-26;  $r = .26$  to  $.38$ , all  $p < .001$ ). The ED-CBQ displayed adequate divergent validity, as indicated by the lack of significant correlation with body mass index (BMI), although it was significantly positively correlated with age. The self-loathing subscale displayed the strongest association with ED diagnostic groups (anorexia nervosa [AN] and BN) relative to the other four subscales.

However, despite these promising initial outcomes, to the best of our knowledge the ED-CBQ has yet to be validated in any population since its preliminary development, and it has only been used in one empirical study (Young & Cooper, 2013). Given the renewed interest in the role of underlying core beliefs in the development and maintenance of EDs (Ansari et al., 2020; Rasouli et al., 2020; Simpson & Smith, 2019), it is timely that an extensive independent assessment of the ED-CBQ be conducted. Fairchild and Cooper (2010) performed only an initial exploratory factor analysis (EFA) to arrive at their final five-factor structure. No confirmatory factor analysis (CFA) has been performed to confirm the conceptualised model. As there is limited information concerning the validity, reliability, and clinical utility (including in relation to ED subgroups) of this questionnaire, it is essential to conduct an extensive psychometric evaluation of its properties. It is also theoretically important to validate a measure that examines the broadest range of ED core belief dimensions, in order to comprehensively identify the most relevant cognitive constructs associated with eating disorder psychopathology.

## Current Study

As such, the aim of the present study was to validate the factor structure and assess the psychometric properties of the ED-CBQ and revise the measure as necessary depending on the outcomes of our evaluation. This included performing a CFA, examining internal consistency, convergent and divergent validity, and examining the ED-CBQ's ability to distinguish between putative ED and non-ED subgroups created using self-reported scores from the Eating Disorder Examination Questionnaire (EDE-Q), and thereby also testing group differences in outcomes. We also aimed to assess the clinical utility of the ED-CBQ using receiver operating characteristic (ROC) curves, in order to determine optimal clinical cut-off scores.

We hypothesised that a CFA would support the original five-factor structure as proposed by Fairchild and Cooper (2010), and that the ED-CBQ would display similar psychometric properties and patterns to that of outcomes reported during its original development. Specifically, we expected the ED-CBQ to have adequate internal consistency and divergent validity, and display good convergent validity, as indicated by positive correlations with a range of other included measures that examined eating disorder related beliefs, attitudes, behaviours, thoughts, and negative emotional states. However, as seen in the development paper (Fairchild & Cooper, 2010), we anticipated the high standards for self-subscale would correlate negatively with the four other subscales and all other included measures. Finally, it was predicted that scores on the ED-CBQ would differ significantly between ED and non-ED groups sample subgroups, such that individuals in the ED subgroup would report greater endorsement of all five dimensions of core beliefs.

## Method

### Participants

A sample of undergraduate university students voluntarily completed an online test battery of questionnaires in exchange for course credit. The sample used in the present study came from a previously published dataset (Burton et al., 2017). Data from 763 participants was included in the present study (71% female;  $M_{age} = 19.36$ ,  $SD = 3.47$ ), in order to validate the factor structure and psychometric properties of the ED-CBQ and examine its ability to discriminate between ED and non-ED subgroups.

A putative ED subgroup of participants ( $n = 384$  [50.3%]; 82.6% female;  $M_{age} = 19.21$ ,  $SD = 3.21$ ) was created based off their self-reported responses from the Eating Disorder Examination Questionnaire (EDE-Q). The literature has suggested using global EDE-Q score of 4 as a clinical cut-off criterion indicative of likely presence of an eating disorder (Fairburn et al., 2008). We intended to create a group representing individuals with both clinical and sub-clinical (or prodromal) symptomatology, and other specified feeding and eating disorders (OSFED) and so considered the cut-off of 4 to be too exclusionary. More recent literature has suggested that optimal EDE-Q clinical cut-off scores vary from 1.68 to 2.93 (Melisse et al., 2021; Rica et al., 2021; Ro et al., 2015; Shaefer et al., 2018). To arrive at a cut-off score that would best capture eating disorder symptomatology, including OSFED, we considered the score that would most closely represent the DSM-5 criterion for FED diagnoses (5th ed.; DSM-5; American Psychiatric Association [APA], 2013). Thus, a global EDE-Q score of 2.5 or higher was used as a cut-off criterion for the ED subgroup. This criterion resulted in an ED subgroup that comprised of approximately half of our sample, which reflects the proportion observed in samples with similar demographics in previous empirical research (Quick et al., 2014). There was no significant difference in age between the ED and non-ED subgroups,  $F(1, 761) = 1.464$ ,  $p = .227$ . However, the proportion of females compared to males was significantly higher in the ED subgroup (82.6% female) compared to the non-ED subgroup (59.4% female),  $\chi^2(2, N = 571) = 50.790$ ,  $p < .001$ .

## Materials

### ***Eating Disorder Core Beliefs Questionnaire (ED-CBQ)***

The ED-CBQ is a 40-item self-report measure that assesses core beliefs relating to EDs (Fairchild & Cooper, 2010). It contains five subscales: self-loathing (10 items), unassertive/inhibited (eight items), high standards for self (eight items), demanding/needing help and support (10 items), and abandoned/isolated (four items). Items were rated on a 7-point scale from *Feels very much untrue* (1) to *Feels very much true* (7), where higher scores reflected higher ED core beliefs.

### ***Eating Disorder Examination Questionnaire (EDE-Q)***

The EDE-Q is a 28-item self-report questionnaire that examines the frequency and severity of ED symptoms experienced 28 days prior to assessment (Fairburn & Beglin, 1994). It contains four subscales: dietary restraint, eating concern, weight concern and shape concern, and items relating to the frequency and severity of binge eating episodes. Items were either rated on a 7-point scale from *No days* (0) to *Every day* (6) or participants recorded the number of times a symptom was experienced. A higher global score (four subscales) reflects greater frequency and severity of symptoms. In the present study, a score of 2.5 or higher was used to create the putative ED subgroup. The EDE-Q is considered the gold-standard self-report assessment tool for examining ED symptomatology (Grilo et al., 2001). The four subscales and the overall EDEQ demonstrated good internal consistencies in the present study ( $\alpha = .80$  to  $.97$ ).

### ***Eating Disorder Beliefs Questionnaire (EDBQ)***

The EDBQ is a 32-item self-report questionnaire that examines core beliefs and underlying assumptions relating to the development and maintenance of EDs (Cooper et al., 1997). It contains four subscales: negative self-beliefs (10 items: e.g., 'I'm a failure.'), acceptance by others (10 items: e.g., 'If I lose weight, people will care about me.'), self-acceptance (six items: 'If my stomach is flat, I'll be more desirable.'), and control over eating (six items: e.g., 'If I eat normally, I'll gain weight.'). Items are rated on a scale from 0 (*I do not usually believe this at all*) to 100 (*I am usually completely convinced that this is true*), where higher scores indicate stronger beliefs or assumptions. Previous validations suggest the EDBQ has good psychometric properties (Bergin & Wade, 2014; Rose et al., 2006). The four subscales and the overall EDBQ demonstrated good internal consistencies in the present study ( $\alpha = .88$  to  $.97$ ).

### ***Dutch Eating Behaviour Questionnaire (DEBQ)***

The DEBQ is a 33-item self-report questionnaire that examines both eating attitudes and behaviours (Van Strien et al., 1986). Two of three subscales were given to participants. The 13-item emotional eating subscale measures the influence of internal cues on eating behaviours (e.g., 'Do you have the desire to eat when you are feeling lonely?'). The 10-item external eating subscale measures the influence of environmental cues on eating behaviours (e.g., 'If you see others eating, do you have the desire to eat?'). Items were rated on a scale from *Never* (1) to *Very often* (5). The DEBQ has been found to be reliable and valid across age-groups and cultures (Malesza, 2021; Malesza & Kaczmarek, 2021; Ohara et al., 2020; Wang et al., 2018). In the present study, the internal consistency for the emotional eating subscale was excellent ( $\alpha = .95$ ) and good for the external eating subscale ( $\alpha = .83$ ).

### ***Body Shape Questionnaire (BSQ)***

The BSQ is a 34-item self-report questionnaire that examines preoccupation with and concerns about body shape experienced in the four weeks prior to assessment (Cooper et al., 1986). Items were rated on a scale from *Never* (1) to *Always* (6), where a higher score indicated greater preoccupation with body shape (e.g., 'Have you felt so bad about your shape that you have cried?'). It has demonstrated good psychometric properties (Wade, 2016). The internal consistency was excellent in our sample ( $\alpha = .98$ ).

### ***Eating Beliefs Questionnaire 18 (EBQ-18)***

The EBQ-18 is an 18-item self-report questionnaire that examines both positive (six items: e.g., 'Eating helps to control my emotions') and negative beliefs (six items: e.g., 'Once I start eating, I can't stop') and permissive beliefs (six items: e.g., 'I like to binge') about food and eating in the absence of hunger (Burton & Abbott, 2018). Items are rated on a scale from *Strongly disagree* (1) to *Strongly agree* (5). The EBQ-18 has been found to be a valid, reliable and clinically useful self-report measure (Burton et al., 2018). The three subscales and the overall EBQ-18 demonstrated good internal consistencies in our sample ( $\alpha = .87$  to  $.92$ ).

### ***Depression Anxiety Stress Scales 21 (DASS-21)***

The DASS-21 is a 21-item self-report questionnaire that examines three related negative emotional states; depression (e.g., 'I felt that life was meaningless'), anxiety (e.g., 'I felt I was close to panic') and stress (e.g., 'I found it hard to wind down'; (Lovibond & Lovibond, 1995). Participants were asked to rate items according to how much each statement applied to them over the past week on a scale of 0 (*Did not apply to me at all*) to 3 (*Applied to me very much or most of the time*), where higher scores indicate higher depression, anxiety and stress. The scale has demonstrated good psychometric properties across cultures (Zanon et al., 2020). The three subscales and the overall DASS-21 demonstrated good internal consistencies in our sample ( $\alpha = .80$  to  $.93$ ).

## **Procedure**

All procedures performed in studies involving human participants were in accordance with the ethical standards of The University of Sydney Human Research Ethics Committee (Project Code: 2014\_082). After informed consent was obtained, participants completed an online test battery of questionnaires using Qualtrics Survey Software that included the measures described in the materials section and additional demographic information. The questionnaires in the online test battery were presented in a randomised order to attempt to reduce any impact of potential fatigue effects. Participants were fully debriefed and provided information and access to mental health services.

## **Statistical Analyses**

Statistical analyses were carried out using IBM Statistical Package for Social Sciences (SPSS) Statistics (version 26.0), predictive analytics software. The overall distribution of data was examined to assess for violations of normality assumptions for all variables for the subgroups and the sample as a whole. Further, if any one item was missing from a subscale on any measure, the mean of the remaining items on that subscale was substituted for the score of the missing item (as per case mean substitution technique; Raymond, 1986). However, if more than one item was missing per subscale, the dataset was omitted from analyses.

CFA's were conducted in IBM SPSS Amos (version 26.0; Arbuckle, 2019) to validate the five-factor structure of the original ED-CBQ model and the subsequent revised models, in both the full sample and with the ED subgroup. We allowed all latent variables to covary, maximum likelihood estimation was used with an unbiased covariance matrix

as input, and there were no missing values. Model fit was evaluated based off cut-off values as suggested in the literature (Hu & Bentler, 1999; Jackson et al., 2009; Marsh et al., 2004; Schreiber et al., 2006).

The internal consistency of the subscales and overall scales were assessed using Cronbach's  $\alpha$ , with values  $> .70$  considered to be acceptable (Terwee et al., 2007). Pearson's correlations were used to examine intercorrelations between subscales and convergent and divergent validity. Differences between the ED and non-ED groups were examined using independent sample  $t$ -tests and one-way analysis of variance (ANOVA).

ROC curve analyses were conducted using the MedCalc program (MedCalc Software, Mariakerke, Belgium) to determine optimal clinical cut-off scores and other indicators of test performance. These included determining area under the curve (AUC), sensitivity (indication of the likelihood of true positives), specificity (indication of the likelihood of false negatives) as well as positive predictive value (PPV; probability the disorder is present when the test is positive) and negative predictive value (NPV; probability the disorder is not present when the test is negative).

## Results

### *Internal Consistency*

Across the full sample and both the ED and non-ED subgroups, the overall ED-CBQ and the self-loathing subscale had excellent internal consistency (See Table 1). Using the full sample ( $N = 763$ ), Cronbach's  $\alpha$  was predicted to increase if the items *Focused*, *Goal-oriented*, and *Self-disciplined* were removed from the overall scale, as it did for the item *Goal-oriented* in the ED subgroup. The demanding subscale displayed good internal consistency across subgroups, and the unassertive subscale acceptable internal consistency, with Cronbach's  $\alpha$  predicted to increase if the item *Unemotional* was removed. The abandoned subscale demonstrated acceptable internal consistency, with Cronbach's  $\alpha$  predicted to increase if the item *Misunderstood* was removed. The high standards for self subscale also had acceptable internal consistency, with Cronbach's  $\alpha$  predicted to increase if the item *Painstaking* was removed. See Table 1 for Cronbach's  $\alpha$ 's.

### *Confirmatory Factor Analyses*

An initial CFA was conducted to validate the five-factor structure of the ED-CBQ. Using the cut-off values indicated in Table 4, it was evident the original five-factor model did not provide an acceptable fit to the observed data for either the full sample or the ED subgroup. In the full sample, items loaded adequately ( $b > .30$ ; Carpenter, 2018) onto their intended factor, except the item '*Painstaking*' ( $b = -.03$ ). In the ED subgroup, items loaded adequately, except for the items '*Painstaking*' ( $b = -.07$ ) and '*Meticulous*' ( $b = .27$ ). Table 4 displays the fit indices from both groups and Table 2 the factor loadings and communalities (all  $> .20$ ; Child, 2006) for all 40 items.

In response to these outcomes, we aimed to develop a revised version of the ED-CBQ, whilst initially intending to retain its original five-factor structure. We aimed to develop a revised model with superior goodness of fit, reliability and validity, and a measure with increased efficiency and clinical utility. Several subsequent models were tested in this process. A final five-factor 18-item model was created by examining the model fit indices, standardised regression coefficients (removing items incrementally with a  $b < .50$ ), item communalities, internal consistencies of each subscale (including Cronbach's  $\alpha$ 's if items were removed) and by using theoretical guidance and judgement. At least three items per subscale were retained to create the resultant model in alignment with best practice guidelines (Carpenter, 2018). As seen in Table 4, the five-factor structure of the revised ED-CBQ-SF demonstrated an

acceptable to good fit to the observed data in both the full sample and the ED subgroup. All items loaded onto their intended factor. Table 4 details the new model, including the revised number of items per subscale, factor loadings (all above .50) and communalities (all > .20; Child, 2006).

Despite the ED-CBQ-SF displaying superior model fit compared to the original 40-item measure, the internal consistency of the overall ED-CBQ-SF increased when removing all items belonging to the high standards for self subscale. Upon examination of both the reliability outcomes and the model fit statistics, we decided to test an alternate four-factor structure model by removing the high standards for self subscale entirely from the revision process. To arrive at our final four-factor 15-item model, the same process was used as outlined previously (i.e., examining a range of psychometric properties of the model and by using theoretical guidance). The final model contained identical items across all four remaining subscales.

As seen in Table 4, the resultant four-factor structure of the revised ED-CBQ-R demonstrated an acceptable to good fit to the observed data in both the full sample and the ED subgroup. All items displayed high loadings onto their intended factor. Table 4 displays all subgroup and sample fit indices and Table 3 details the final model, including the four subscales, factor loadings (all above .55) and communalities (all > .20; Child, 2006).

### ***Internal Consistency: ED-CBQ-SF and ED-CBQ-1R***

In the full sample and both subgroups, the total ED-CBQ-SF and ED-CBQ-R, and the self-loathing subscale displayed good internal consistency. All other subscales displayed adequate internal consistency (See Table 5). In the full sample and in both subgroups, Cronbach's  $\alpha$  was predicted to increase if the items *Focussed*, *Goal-oriented*, and *Self-disciplined* were removed from the overall ED-CBQ-SF, if the item *Self-disciplined* was removed from the high standards for self subscale, and the item *Deprived* from the abandoned subscale.

### ***Subscale Inter-correlations***

All ED-CBQ subscales were significantly positively correlated with the overall scale ( $r = .35^{**}$  to  $.86^{**}$ ). Four of five subscales were significantly positively correlated with each other ( $r = .50^{**}$  to  $.61^{**}$ ). Only the high standards for self subscale displayed a different pattern of relationships with the other subscales. It did not significantly correlate with the self-loathing subscale ( $r = -.07$ ) and demonstrated weak positive correlations with all other subscales ( $r = .09^*$  to  $.18^{**}$ ).

All the ED-CBQ-SF subscales were significantly positively correlated with the revised overall scale ( $r = .68^{**}$  to  $.80^{**}$ ), except the high standards for self subscale ( $r = -.01$ ). Four of five subscales were significantly positively correlated with each other ( $r = .40^{**}$  to  $.55^{**}$ ). Conversely, the high standards for self subscale was significantly negatively correlated with all other subscales ( $r = -.18^{**}$  to  $-.27^{**}$ ). The ED-CBQ-R was significantly positively correlated with all four of its subscales ( $r = .73^{**}$  to  $.82^{**}$ ).

### ***Construct Validity***

#### **Convergent**

The total ED-CBQ, self-loathing, demanding, unassertive and abandoned subscales were all significantly positively correlated with all other included measures (BSQ, DASS-21, DEBQ-emotional, DEBQ-external, EBQ, EDBQ, EDE-Q) and their respective subscales. The high standards for self-subscale was not significantly correlated with the

majority of other measures included. This subscale only displayed weak positive correlations with the EDBQ self-acceptance subscale and DASS-21 stress subscale, and weak negative correlations with the DASS-21 depression subscale and the EBQ-18 permissive beliefs subscale. See Table 6 for all correlations.

The revised overall ED-CBQ-SF, self-loathing, demanding, unassertive and abandoned subscales were all significantly positively correlated with all other included measures and their respective subscales. The ED-CBQ-SF was only not significantly correlated with the EDE-Q restraint subscale. The high standards for self subscale was only significantly negatively correlated with the DASS-21 subscales, the overall EBQ-18, the EDE-Q shape concern subscale, and the overall EDBQ and each of its subscales, apart from the self-acceptance subscale. The revised overall ED-CBQ-R was significantly positively correlated with all other included measures and their respective subscales. See Table 7 for correlations.

### **Divergent**

We examined the correlations between age and body mass index (BMI) and the total ED-CBQ and its subscales to test for divergent validity, as these variables were used for a similar purpose in the original ED-CBQ paper (Fairchild & Cooper, 2010). The total ED-CBQ, self-loathing, unassertive, demanding and high standards for self subscales were not significantly correlated with age. Only the abandoned subscale displayed a weak significant positive correlation with age. The overall ED-CBQ, unassertive, demanding and abandoned subscales were not significantly correlated with BMI. However, the self-loathing subscale was significantly positively correlated with BMI, and the high standards for self subscale displayed a weak negative correlation with BMI. See Table 6 for all correlations.

The revised overall ED-CBQ-SF, self-loathing, unassertive, demanding and high standards for self subscales were not significantly correlated with age, however the abandoned subscale displayed a weak positive correlation with age. The overall ED-CBQ-SF, demanding and abandoned subscales were not significantly correlated with BMI. However, the self-loathing and abandoned subscales were significantly positively correlated with BMI, and the unassertive subscale displayed a weak negative correlation with BMI. The revised ED-CBQ-R was not significantly correlated with age or BMI. See Table 7 for correlations.

### ***Descriptive Statistics***

Of the possible range of scores (1 to 7), scores on the overall ED-CBQ in our sample ranged from 1 (0.4%) to 6.68 (0.1%), from 1 (27.1%) to 7 (0.1%) on the self-loathing subscale, from 1 (3.9%) to 6.5 (0.1%) on the unassertive subscale, from 1 (10.2%) to 7 (0.1%) on the abandoned subscale, from 1 (1.8%) to 6.6 (0.1%) on the demanding subscale, and from 1 (0.7%) to 7 (0.1%) on the high standards for self subscale. On the total ED-CBQ-SF scores ranged from 1 (0.5%) to 6.67 (0.1%), from 1 (54.3%) to 7 (0.4%) on the self-loathing subscale, from 1 (10.4%) to 7 (0.1%) on the unassertive subscale, from 1 (27.7%) to 7 (0.5%) on the abandoned subscale, from 1 (5.1%) to 6.6 (0.1%) on the demanding subscale, and from 1 (0.9%) to 7 (4.8%) on the high standards for self subscale. Scores on the total ED-CBQ-R in our sample ranged from 1 (2%) to 6.67 (0.1%). See Table 8 for all relevant descriptive statistics.

### ***Group Differences***

Results from independent samples *t*-tests revealed that participants in the ED subgroup scored significantly higher on the original 40-item ED-CBQ total scale than those in the non-ED subgroup (See Table 8 for all relevant inferential statistics). Participants in the ED subgroup also scored significantly higher than the non-ED subgroup on the self-

loathing, unassertive, abandoned, and demanding subscales. However, there was no significant difference between the ED and non-ED subgroups on the high standards for self subscale. We also examined the relationship between the ED-CBQ and its subscales with binge frequency, as determined by self-reported scores on the EDE-Q. The overall ED-CBQ ( $r = .17^{**}$ ), self-loathing ( $r = .20^{**}$ ), demanding ( $r = .20^{**}$ ), and abandoned ( $r = .14^{**}$ ) subscales were all significantly positively correlated with binge frequency, whereas the unassertive ( $r = .04$ ) and high standards for self ( $r = -.02$ ) subscales were not significantly correlated with binge frequency.

Participants in the ED subgroup scored significantly higher than those in the non-ED subgroup on the overall revised ED-CBQ-SF, and the self-loathing, unassertive, abandoned, and demanding subscales. However, participants in the ED subgroup scored significantly lower than those in the non-ED subgroup on the high standards for self subscale. The overall ED-CBQ-SF ( $r = .16^{**}$ ), self-loathing ( $r = .18^{**}$ ), demanding ( $r = .17^{**}$ ), and abandoned ( $r = .15^{**}$ ) subscales were all significantly positively correlated with binge frequency, and the high standards for self subscale significantly negatively correlated with binge frequency ( $r = .08^*$ ). Only the unassertive subscale was not significantly correlated with binge frequency ( $r = .03$ ).

Participants in the ED subgroup scored significantly higher on the ED-CBQ-R than those in the non-ED subgroup. Further, the ED-CBQ-R was significantly positively correlated with binge frequency ( $r = .17^{**}$ ).

### ***ROC Curves***

ROC curve analyses were performed to determine optimal clinical cut-off scores and other indicators of test performance for the ED-CBQ, and the revised ED-CBQ-SF and ED-CBQ-R. The cut-off criterion reported was one for which both the sensitivity and specificity was maximal (using the Youden-Index; Fluss et al., 2005). Table 9 outlines the cut-off scores and all other included test performance indicators using the comparison sample of the ED ( $n = 384$ ) versus non-ED ( $n = 379$ ) subgroups.

The cut-off scores for the total ED-CBQ, self-loathing, demanding, unassertive and abandoned subscales all had significant AUC values, indicating these cut-off values function better than chance at discriminating between individuals with clinical or sub-clinical eating disorder symptomatology compared to those without. The AUC value for the high standards for self subscale was not significant, which indicated that this subscale may not be a reliable indicator of differences between these groups of individuals.

Further, the cut-off scores for the revised ED-CBQ-SF and each of its subscales, and the revised ED-CBQ-R had significant AUC values, indicating these cut-off values function better than chance at discriminating between individuals with clinical or sub-clinical eating disorder symptomatology compared to those without.

## **Discussion**

The present study aimed to evaluate the psychometric properties of the ED-CBQ and to develop a revised and improved version of the original measure, as necessary, after evaluating its factor structure and related properties. Contrary to our primary hypothesis, results did not support the original five-factor 40-item ED-CBQ model as proposed by Fairchild and Cooper (2010). However, the ED-CBQ total scale score displayed acceptable internal consistency and construct validity, and the ED subgroup reported significantly greater endorsement of four of five dimensions of core beliefs compared to the non-ED subgroup.

In response to the outcomes of our primary evaluation of the factor structure of the ED-CBQ, two revised versions were developed that both possessed equal or superior psychometric properties to the original 40-item measure. The ED-CBQ-SF and ED-CBQ-R both demonstrated superior model fit compared to the ED-CBQ, similar levels of reliability and construct validity, the ability to discriminate between putative ED diagnostic groups, and increased practical and theoretical value.

## **ED-CBQ**

It was evident the five-factor structure of the original 40-item ED-CBQ was not supported by our data. Several items only displayed adequate loadings and two items did not load onto their intended factor (Carpenter, 2018). Our results also indicated that although all subscales demonstrated acceptable internal consistency, the self-loathing subscale was the most reliable, as it was in the development paper (Fairchild & Cooper, 2010). Notably, removing several items from the high standards for self subscale increased the reliability of the overall ED-CBQ. Further, all subscales were strongly positively correlated, apart for the high standards for self subscale, which did not correlate with the self-loathing subscale and had only weak positive correlations with the other subscales. The overall ED-CBQ and four of five subscales demonstrated good convergent validity and adequate divergent validity. Only the high standards for self subscale did not demonstrate good construct validity.

Individuals in the ED subgroup reported significantly higher scores on the overall ED-CBQ, self-loathing, unassertive, abandoned and demanding subscales compared to those in the non-ED subgroup. This supports both findings from the development paper (Fairchild & Cooper, 2010) and previous literature which has evidenced the relationship between these core beliefs and binge eating, purging and restrictive behaviours in a variety of clinical ED presentations (Jones et al., 2007). Scores on the high standards for self subscale did not significantly differ between the ED and non-ED subgroups. Interestingly, this subscale was endorsed the most highly on average compared to any other subscale, indicating all participants equally endorsed having relatively high standards for themselves. As suggested by existing theoretical and empirical literature, having high standards for the self remains a theoretically important construct for individuals with particular ED presentations (Jones et al., 2007; Bardone-Cone et al., 2020). However, the subscale was unable to discriminate between ED subgroups in our sample. Moreover, it did not correlate significantly with binge frequency. This finding does not support previous literature that has suggested unrelenting standards and perfectionistic tendencies have been associated with binge eating (Jones et al., 2007).

Taken together, this pattern of results indicates that having high standards for oneself appears to be conceptually distinct to beliefs of self-loathing, feeling abandoned, or believing oneself to be demanding or unassertive in the context of eating disorders. As such, we propose a possible explanation for this overall pattern. Each of the latter concepts represents of a pattern of maladaptive core beliefs characterised by endorsing a negative or undesirable view of the self. In contrast, having high or unrelenting standards for oneself appears comparatively more positive or desirable. As such, this construct may have better aligned with the other more negative dimensions of core beliefs if phrased in a way that individuals perceived themselves to be failing to meet those standards. The literature has indicated that although individuals with EDs may ultimately have higher standards for themselves, those individuals displaying binge eating, purging and restrictive behaviours are more self-critical and as such may perceive themselves to have insufficient self-control or to have failed to achieve those standards (Bardone-Cone et al., 2020; Jones et al., 2007; Vervaet et al., 2021). Thus, it is possible that a concept with more negative valence would have not only better captured this dimension of core beliefs in ED individuals, but also increased inter-subscale correlations, and ultimately the internal consistency and validity of the overall scale.

Optimal clinical cut-off scores for the ED-CBQ were also identified in order to provide new information regarding its potential clinical utility. The significant AUC values suggest that even the relatively low cut-off scores identified for the self-loathing, demanding, unassertive and abandoned subscales can reliably discriminate between individuals with clinically significant feeding and eating disorder symptomatology compared to those without. ROC curve analyses did not support the use of the high standards for self-subscale to differentiate between these groups of individuals. It is important to note however, that these scores cannot be utilised in place of examining DSM-5 diagnostic criteria but can instead provide important supplementary information by identifying clinically significant treatment targets (i.e., core beliefs) for those who have been diagnosed with an eating or feeding disorder.

## **ED-CBQ-SF**

Although the high standards for self-subscale failed to thematically align with the other subscales, we were hesitant to immediately remove it in its entirety whilst revising the original measure, before first examining the factor structure, reliability and validity of the revised model. The final five-factor ED-CBQ-SF demonstrated superior model fit, factor loadings, and communalities in the full sample and ED subgroup compared to the original ED-CBQ. Overall, the reliability of each revised subscale was comparable to that of the original measure (all  $\alpha > .70$ ). Although the internal consistency of the overall ED-CBQ-SF ( $\alpha = .80$  to  $.82$ ) was lower than that of the overall ED-CBQ ( $\alpha = .90$  to  $.92$ ), this was to be expected given the reduced number of items overall and per subscale (Cortina, 1993). However, Cronbach's  $\alpha$  was still predicted to increase substantially if all three items from the high standards to self subscale were removed from the overall ED-CBQ-SF. Moreover, the self-loathing, unassertive, demanding and abandoned subscales were all positively correlated, whereas the high standards for self subscale was negatively correlated with all four other subscales.

Although the high standards for self subscale demonstrated increased convergent validity in the ED-CBQ-SF compared to the original 40-item ED-CBQ, when compared to the other subscales its inconsistent pattern of correlations with all other included measures indicated it only exhibited adequate convergent validity at best. The overall ED-CBQ-SF, self-loathing, unassertive, demanding and abandoned subscales all displayed good convergent and adequate divergent validity. Like the original measure, the overall ED-CBQ-SF, self-loathing, unassertive, abandoned and demanding subscales were able to discriminate between the ED and non-ED subgroups of participants. However, again we observed that individuals in the ED subgroup reported significantly lower scores on the revised high standards for self subscale than those in the non-ED group. This outcome is no longer surprising from the perspective of our proposed explanation, that is, that individuals with EDs hold perfectionistic and high standards for themselves and moreover, they view their beliefs about attaining high standards as positive. However, individuals with EDs then experience distress and related negative self-beliefs as a result of poor or reduced self-efficacy in meeting desired standards. It is likely those individuals displaying clinically significant ED symptoms are more self-critical whilst evaluating how they 'measure up' to their stringent or unrelenting standards (Bardone-Cone et al., 2020). Items describing high standard beliefs from this perspective may facilitate a better fit for this subscale in the ED-CBQ-SF.

Moreover, the ED-CBQ-SF, self-loathing, demanding and abandoned subscales were all positively correlated with binge frequency. This is consistent with previous empirical research that has found abandonment, dependence, shame and social undesirability schemas were related to binge eating in individuals diagnosed with BED and BN (Jones et al., 2007). The unassertive subscale was not significantly correlated with binge frequency, which is an unexpected result given that previous research has found that the related construct of emotional inhibition was

associated with clinically significant binge eating (Jones et al., 2007). Further, the revised high standards for self subscale was significantly negatively correlated with binge frequency.

The significant AUC values identified using ROC curve analyses suggested that the clinical cut-off scores for the ED-CBQ-SF and all five subscales can be used to reliably differentiate between ED and non-ED subgroups. However, unlike in the original measure, the ED-CBQ-SF high standards for self subscale demonstrated the ability to discriminate reliably between sample subgroups. A clinical cut-off score of  $\leq 4$  was able to identify individuals with clinical levels of feeding and eating disorder symptomatology compared to those without.

Overall, the ED-CBQ-SF displayed similar internal consistency and divergent validity to the ED-CBQ, but demonstrated superior model fit and convergent validity and is a more efficient tool for measurement of ED core beliefs. However, the total scale score remains less interpretable due to the inclusion of the high standards for self subscale.

### **ED-CBQ-R**

The ED-CBQ-R was created to address the remaining shortcomings of the ED-CBQ18, to increase model fit, and with the aim to improve the overall reliability and interpretability of the short-form ED-CBQ. The final four-factor model demonstrated superior model fit, higher factor loadings and better communalities compared to the both the ED-CBQ and ED-CBQ-SF. The internal consistency of the overall ED-CBQ-R ( $\alpha = .86$  to  $.89$ ) was also comparable to that of the original ED-CBQ, despite reducing the overall number of items. The overall scale also displayed excellent construct validity, as evidenced by the consistent strong positive correlations with the wide variety of related measures, and not being significantly correlated with age or BMI. The ED-CBQ-R was significantly positively correlated with binge frequency and was able to discriminate between ED and non-ED subgroups, with a clinical cut-off score of  $>2.8$  found to be able to identify individuals with clinical or sub-clinical eating disorder symptomatology. In all, the ED-CBQ-R represents a refined, brief, and efficient measure with strong psychometric properties, that remains clinically useful and easily interpretable, but is still able to examine four diverse core belief dimensions pertinent to transdiagnostic eating disorder related symptoms and behaviours.

### **Theoretical and Clinical Implications**

The present research has both theoretical and clinical significance. Theoretically, the outcomes of our studies have validated the importance of self-loathing, feeling abandoned or isolated, believing oneself to be demanding, needing help or being unassertive or emotionally inhibited for individuals reporting clinical or sub-clinical eating disorder symptomatology. We have provided evidence supporting the relationship between these specific ED core belief dimensions and the presence of eating, weight and shape concerns and restriction and binge eating. Further, although having high or unrelenting standards for oneself remains a critically important construct in individuals displaying these concerns and behaviours, our research provides theoretical support for the idea that these individuals may also be more self-critical or ultimately perceive themselves to be failing to meet those standards. Thus, to best capture this dimension in individuals with eating and feeding disorders, it may be pertinent to investigate either the aspiration towards those standards or alternatively the perceived failure to meet them.

Practically, previously only the YSQ and EDBQ have been utilised extensively in research to identify maladaptive ED core beliefs. This research provides the first psychometric evaluation of the ED-CBQ, as the only existing measure designed to solely and specifically assess ED core beliefs. This evaluation ultimately allowed us to develop two revised short-form scales with increased practical and clinical utility, which possess psychometric properties that

were equal or superior to the original scale. In keeping the original five-factor structure, the ED-CBQ-SF allows researchers and clinicians to comprehensively assess the most relevant cognitive constructs associated with eating disorder psychopathology, whilst still being a brief, valid and reliable measure. The ED-CBQ-R provides other theoretical and practical advantages, by possessing superior factor structure, internal consistency, construct validity, and importantly overall interpretability compared to that of the ED-CBQ-SF. Given maladaptive core beliefs may be key transdiagnostic factors increasing vulnerability to the development and maintenance of EDs (Vervaeke et al., 2021), in conjunction with standard assessment of ED symptomatology, these new measures may be promising tools for identifying and monitoring treatment targets in both cognitive behavioural and schema therapy.

## **Limitations and Future Directions**

Notwithstanding the theoretical and practical significance of this research, there are several limitations worth noting. Firstly, our studies were conducted using a non-clinical sample of university students. As such, the ED subgroups were not created on the basis of a formal diagnosis or clinical interview but on self-reported outcomes of participants. Further, as a core beliefs measure, we would theoretically expect a high level of stability of self-reported outcomes on all ED-CBQ dimensions (Young, 1990). However, we were unable to assess test-retest reliability. To address these limitations, future research should replicate the current research in a clinical group with a focus on assessing temporal stability of outcomes.

It would be also interesting for future research to address other gaps and questions left unanswered by the present research, such as examining potential differences between specific ED subgroups (i.e., differentiating subscales between AN, BN, BED and OSFED groups) and possible gender differences in outcomes. We did not examine gender differences, as like much of ED research, the vast majority of our sample was female. Future research should certainly emphasise the recruitment of male participants for more focussed investigation. Finally, this was only a preliminary validation of the EDCBQ-18 and EDCBQ-15. Promising outcomes from the present study indicate this research warrants future replication in treatment-seeking sample. It would also be pertinent to validate the ED-CBQ-SF and ED-CBQ-R across diverse age-groups in order to compare the presence of different core belief constructs across developmental stages to better understand their role as predisposing and maintaining factors.

## **Conclusion**

In all, we extend existing literature by providing the first evaluation of the factor structure and psychometric properties of the ED-CBQ since its development. We also present two revised short form versions of the original measure. The current findings suggest that the ED-CBQ-SF and ED-CBQ-R are both valid, reliable, but more importantly efficient and accessible measures with the potential to be utilised both clinically and in research settings. It is critical to continue to utilise validated cognitive assessment tools alongside diagnostic and symptomatic measures. The ED-CBQ-SF and ED-CBQ-R may also prove useful in future theoretical and empirical research when considering the core cognitive features underlying a variety of disordered eating and feeding presentations.

## **Abbreviations**

AN = Anorexia Nervosa; ANOVA = Analysis of Variance; APA = American Psychiatric Association; AUC = Area under the curve; BED = Binge Eating Disorder; BMI = Body Mass Index; BN = Bulimia Nervosa; BSQ = Body Shape Questionnaire; CBT = Cognitive Behavioural Therapy; CFA = Confirmatory Factor Analysis; CFI = Comparative Fit

Index; CI = Confidence Intervals; DASS-21 = Depression Anxiety Stress Scale 21; DEBQ = Dutch Eating Behaviour Questionnaire; EBQ-18 = Eating Beliefs Questionnaire 18; ED = Eating Disorder; EDBQ = Eating Disorder Beliefs Questionnaire; ED-CBQ = Eating Disorders Core Beliefs Questionnaire; EDE = Eating Disorders Examination; EDE-Q = Eating Disorder Examination Questionnaire; EFA = Exploratory Factor Analysis; EDNOS = Eating Disorders Not Otherwise Specified; NFI = normed fit index; NPV = Negative predictive value; OSFED = Other Specified Feeding and Eating Disorders; PPV = Positive predictive value; RMSEA = Root Mean Square Error of Approximation; RFI = Relative fit index; ROC = Receiver operating characteristic curve; SD = Standard Deviation; SFCBT = Schema-Focussed Cognitive-Behavioural Therapy; SPSS = Statistical Package for Social Sciences; TLI = Tucker-Lewis Index; YSQ = Young Schema Questionnaire;  $\chi^2/df$  = chi-square/degrees of freedom.

## **Declarations**

### **Author's Contributions**

Material preparation and data collection was performed by AB. All authors were involved in the conception and design of the study. AH and AB conducted the analysis and interpretation of the data. AH prepared the first draft of the manuscript, and subsequent versions were developed in collaboration with AB and MA. All authors read and approved the final manuscript.

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### **Availability of data and materials**

The datasets used and/or analysed during the current study available from the corresponding author on reasonable request.

### **Competing Interests**

The authors declare no conflicts of interest. There are no relevant financial or non-financial competing interests to report or benefits that have arisen from this research.

### **Consent for Publication**

Participants consented to their data being used for research purposes and consented to unidentifiable aggregate data to be published.

### **Ethics Approval and Consent to Participate**

This study was approved as part of a larger student project ('Investigating the clinical utility of the Eating Beliefs Questionnaire', approval number 2014/082) by the University of Sydney Human Research Ethics Committee. All participants were provided with a participant information statement and provided their consent to participate in the study. All participants read a Participant Information Statement allowing them to make an informed choice as to whether they wanted to participate in the research or not. They were informed that they could also cease participation at any stage with no penalty to them. The ethics of the consent procedure was approved as above.

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## Tables

**Table 1** *Internal Consistencies of the ED-CBQ Total and Subscales in the Full Sample, ED and non-ED Subgroups*

	Total ED- CBQ	Self- Loathing	Unassertive	Demanding	Abandoned	High Standards for Self
Full Sample ( <i>N</i> = 763)	<i>a</i> = .92	<i>a</i> = .93	<i>a</i> = .80	<i>a</i> = .85	<i>a</i> = .77	<i>a</i> = .76
ED subgroup ( <i>n</i> = 384)	<i>a</i> = .92	<i>a</i> = .93	<i>a</i> = .78	<i>a</i> = .85	<i>a</i> = .76	<i>a</i> = .75
Non-ED subgroup ( <i>n</i> = 379)	<i>a</i> = .90	<i>a</i> = .90	<i>a</i> = .81	<i>a</i> = .82	<i>a</i> = .71	<i>a</i> = .78

*Note.* ED = Eating Disorder; ED-CBQ = Eating Disorder Core Beliefs Questionnaire.

**Table 2** *Confirmatory Factor Analysis Factor Loadings, Communalities ( $h^2$ ) and Cronbach's *a* if Item Deleted for the Five-factor Model of the ED-CBQ in the Full Sample and ED subgroup*

Item	Full Sample ( <i>n</i> = 763)			ED Subgroup ( <i>n</i> = 384)		
	Factor Loadings	<i>h</i> <sup>2</sup>	<i>a</i> if Item Deleted	Factor Loadings	<i>h</i> <sup>2</sup>	<i>a</i> if Item Deleted
<b>Self-Loathing</b>						
Disgraceful	.73	.60	.92	.72	.57	.93
Evil	.69	.54	.92	.72	.61	.93
Filthy	.72	.52	.92	.71	.53	.93
Inhuman	.67	.49	.93	.70	.53	.93
Nasty	.68	.55	.93	.68	.56	.93
Poisonous	.72	.53	.92	.74	.58	.93
Putrid	.85	.77	.92	.86	.82	.92
Repugnant	.85	.71	.92	.84	.75	.92
Repulsive	.82	.68	.92	.83	.73	.92
Vile	.85	.75	.92	.86	.77	.92
<b>Unassertive</b>						
Inhibited	.55	.37	.79	.55	.39	.76
Meek	.61	.41	.778	.56	.44	.75
Reserved	.47	.31	.80	.38	.30	.78
Submissive	.64	.41	.77	.57	.41	.75
Unassertive	.77	.56	.76	.72	.58	.73
Undemonstrative	.80	.60	.76	.79	.61	.73
Unemotional	.37	.40	.81	.38	.51	.78
Unreflective	.47	.36	.79	.50	.57	.76
<b>Demanding</b>						
Complaining	.66	.49	.83	.64	.50	.84
Demanding	.60	.47	.83	.57	.57	.84
Ill-tempered	.60	.37	.84	.60	.38	.84
Immature	.46	.27	.85	.53	.40	.85
Manipulative	.51	.35	.84	.57	.44	.84
Needy	.65	.47	.83	.61	.49	.84
Possessive	.62	.38	.84	.63	.44	.84
Selfish	.69	.49	.83	.71	.54	.83

Superficial	.64	.41	.83	.62	.44	.84
Suspicious	.60	.36	.84	.60	.37	.84
<b>Abandoned</b>						
Abandoned	.80	.44	.66	.80	.73	.64
Betrayed	.73	.35	.70	.74	.54	.67
Deprived	.67	.41	.73	.65	.41	.72
Misunderstood	.56	.38	.78	.52	.36	.78
<b>High Standards for Self</b>						
Conscientious	.36	.26	.75	.38	.26	.73
Focused	.83	.60	.73	.84	.66	.71
Goal-oriented	.82	.61	.73	.84	.68	.71
Meticulous	.33	.37	.73	.27	.70	.72
Painstaking	-.03	.42	.79	-.07	.46	.78
Perfectionistic	.46	.43	.72	.44	.44	.70
Persistent	.55	.44	.72	.54	.49	.70
Self-disciplined	.61	.42	.74	.57	.42	.73

*Note.* Cronbach's  $\alpha$  if item deleted refers to the item being removed from its subscale, not from the overall scale. ED = Eating Disorder.

**Table 3** *Confirmatory Factor Analysis Factor Loadings, Communalities ( $h^2$ ) and Cronbach's  $\alpha$  if Item Deleted for the ED-CBQ-SF and ED-CBQ-R*

Item	ED-CBQ-SF Full Sample (n = 763)			ED-CBQ-SF ED Subgroup (n = 384)			ED-CBQ-R Full Sample (n = 763)		ED-CBQ-R ED Subgroup (n = 384)	
	Factor Loadings	<i>h</i> <sup>2</sup>	a if Item Deleted	Factor Loadings	<i>h</i> <sup>2</sup>	a if Item Deleted	Factor Loadings	<i>h</i> <sup>2</sup>	Factor Loadings	<i>h</i> <sup>2</sup>
	<b>Self-Loathing</b>									
Putrid	.90	.84	.90	.84	.89	.91	.90	.84	.92	.86
Repugnant	.89	.79	.89	.79	.89	.88	.89	.79	.88	.77
Repulsive	.87	.75	.87	.75	.90	.87	.87	.74	.87	.76
Vile	.82	.67	.82	.67	.92	.82	.82	.67	.82	.68
<b>Unassertive</b>										
Inhibited	.59	.35	.59	.35	.73	.62	.59	.36	.62	.39
Meek	.65	.48	.65	.48	.67	.60	.65	.49	.59	.45
Submissive	.69	.50	.69	.50	.67	.60	.69	.49	.60	.42
Unassertive	.68	.47	.68	.47	.67	.63	.68	.46	.63	.41
<b>Demanding</b>										
Complaining	.66	.44	.66	.44	.70	.63	.66	.44	.63	.39
Needy	.71	.54	.71	.54	.66	.68	.71	.54	.68	.56
Possessive	.63	.40	.63	.40	.71	.64	.63	.39	.64	.41
Selfish	.62	.39	.62	.39	.70	.65	.62	.40	.65	.42
<b>Abandoned</b>										
Abandoned	.83	.72	.83	.72	.62	.83	.83	.73	.83	.72
Betrayed	.75	.59	.75	.59	.69	.75	.76	.57	.75	.56
Deprived	.65	.44	.65	.44	.80	.64	.65	.44	.64	.41
<b>High Standards for Self</b>										
Focused	.87	.74	.87	.74	.65	.87	-	-	-	-
Goal-oriented	.83	.73	.83	.73	.67	.85	-	-	-	-
Self-disciplined	.58	.36	.58	.36	.84	.53	-	-	-	-

Note. Cronbach's  $\alpha$  if item deleted refers to the item being removed from its subscale, not from the overall scales. ED = Eating Disorder; ED-CBQ = Eating Disorder Core Beliefs Questionnaire; ED-CBQ-SF = Eating Disorder Core Beliefs Questionnaire Short Form; ED-CBQ-R = Eating Disorder Core Beliefs Questionnaire Revised.

**Table 4** Model Fit Indices for the Original Five-factor Model of the ED-CBQ and the ED-CBQ-SF and ED-CBQ-R

Fit Index	Cut-off values		ED-CBQ	ED-CBQ	ED-CBQ-SF	ED-CBQ-SF	ED-CBQ-R	ED-CBQ-R
	Acceptable	Good	Full Sample ( <i>n</i> = 763)	ED Subgroup ( <i>n</i> = 384)	Full Sample ( <i>n</i> = 763)	ED Subgroup ( <i>n</i> = 384)	Full Sample ( <i>n</i> = 763)	ED Subgroup ( <i>n</i> = 384)
$\chi^2/df$	$\leq 3.00$	$\leq 2.00$	5.30	3.31	2.90	2.06	3.19	1.98
CFI	$\geq .90$	$\geq .95$	.79	.77	.96	.96	.97	.97
TLI	$\geq .90$	$\geq .95$	.77	.76	.95	.95	.96	.96
RFI	$\geq .90$	$\geq .95$	.73	.68	.93	.90	.94	.92
NFI	$\geq .90$	$\geq .95$	.75	.70	.94	.92	.95	.94
RMSEA [90% CI]	$\leq .080$	$\leq .050$	.075 [.073, .077]	.078 [.074, .081]	.050 [.044, .056]	.052 [.043, .062]	.054 [.047, .061]	.051 [.039, .062]

Note. Absolute fit indices:  $\chi^2/df$  = chi-square/degrees of freedom. ED = Eating Disorder; ED-CBQ = Eating Disorder Core Beliefs Questionnaire; ED-CBQ-SF = Eating Disorder Core Beliefs Questionnaire Short Form; ED-CBQ-R = Eating Disorder Core Beliefs Questionnaire Revised; Comparative fit indices: CFI = Comparative fit index; NFI = normed fit index; RFI = Relative fit index; TLI = Tucker-Lewis index. RMSEA = root mean square error of approximation; CI = confidence interval.

**Table 5** Internal Consistencies of the ED-CBQ-SF, ED-CBQ-R and Subscales

	Total ED- CBQ-SF	Self- Loathing	Unassertive	Demanding	Abandoned	High Standards for Self	Total ED- CBQ- R
Full Sample ( <i>N</i> = 763)	<i>a</i> = .82	<i>a</i> = .92	<i>a</i> = .74	<i>a</i> = .75	<i>a</i> = .78	<i>a</i> = .80	<i>a</i> = .89
ED subgroup ( <i>n</i> = 384)	<i>a</i> = .81	<i>a</i> = .93	<i>a</i> = .71	<i>a</i> = .75	<i>a</i> = .78	<i>a</i> = .78	<i>a</i> = .88
Non-ED subgroup ( <i>n</i> = 379)	<i>a</i> = .80	<i>a</i> = .89	<i>a</i> = .76	<i>a</i> = .72	<i>a</i> = .71	<i>a</i> = .81	<i>a</i> = .86

Note. The high standards for self subscale was only included in the ED-CBQ-SF. ED = Eating Disorder; ED-CBQ = Eating Disorder Core Beliefs Questionnaire; ED-CBQ-SF = Eating Disorder Core Beliefs Questionnaire Short Form; ED-

CBQ-R = Eating Disorder Core Beliefs Questionnaire Revised.

**Table 6** *Correlations of the Total ED-CBQ and Subscales with Other Included Measures in the Full Sample (N = 763)*

	Total ED-CBQ Mean (SD)	Self-Loathing Mean (SD)	Unassertive Mean (SD)	Demanding Mean (SD)	Abandoned Mean (SD)	High Standards for Self  Mean (SD)
<b>Age</b>	.022	.006	.013	-.024	.076*	.050
<b>BMI</b>	.028	.142**	-.039	.021	.029	-.080*
<b>BSQ</b>	.409**	.388**	.258**	.368**	.417**	.015
<b>DASS-21- Depression</b>	.536**	.519**	.421**	.477**	.592**	-.101**
<b>DASS-21- Anxiety</b>	.515**	.467**	.387**	.449**	.488**	.029
<b>DASS-21- Stress</b>	.553**	.452**	.337**	.540**	.532**	.093*
<b>DEBQ- Emotional</b>	.365**	.291**	.221**	.361**	.353**	.064
<b>DEBQ-External</b>	.245**	.153**	.128**	.320**	.164**	.057
<b>EBQ-18 Total</b>	.421**	.409**	.328**	.409**	.367**	-.065
EBQ-18- Positive	.380**	.328**	.287**	.357**	.369**	-.003
EBQ-18- Negative	.418**	.429**	.291**	.409**	.376**	-.067
EBQ-18- Permissive	.209**	.229**	.208**	.215**	.124**	-.094**
<b>EDBQ Total</b>	.587**	.589**	.412**	.507**	.576**	-.026
EDBQ- Negative	.622*	.597**	.496**	.521**	.658**	-.057
EDBQ-Self- acceptance	.406**	.343**	.251**	.381**	.380**	.077*
EDBQ-Other- acceptance	.463**	.505**	.297**	.408**	.432**	-.035
EDBQ-Eating Control	.462**	.524**	.321**	.380**	.433**	-.050
<b>EDE-Q Global</b>	.391**	.415**	.232**	.336**	.410**	-.008
EDE-Q- Restraint	.242**	.279**	.116**	.189**	.247**	.028
EDE-Q-Eating Concern	.393**	.433**	.235**	.333**	.418**	-.029
EDE-Q-Weight Concern	.351**	.390**	.202**	.298**	.361**	-.013
EDE-Q-Shape	.392**	.392**	.246**	.352**	.421**	-.012

*Note.* BMI = Body Mass Index; BSQ = Body Shape Questionnaire; DASS-21 = Depression Anxiety Stress Scale 21; DEBQ = Dutch Eating Behaviour Questionnaire; EBQ-18 = Eating Beliefs Questionnaire 18; EDBQ = Eating Disorder Beliefs Questionnaire; ED = Eating Disorder; ED-CBQ = Eating Disorder Core Beliefs Questionnaire; EDE-Q = Eating Disorder Examination Questionnaire; SD = Standard Deviation.

\* $p < .05$  (two-tailed). \*\* $p < .01$  (two-tailed).

**Table 7** *Correlations of the ED-CBQ-SF and ED-CBQ-R and Subscales with Other Included Measures in the Full Sample (N = 763)*

	Total ED-CBQ-SF Mean (SD)	Self-Loathing Mean (SD)	Unassertive Mean (SD)	Demanding Mean (SD)	Abandoned Mean (SD)	High Standards for Self Mean (SD)	Total ED-CBQ-R Mean (SD)
<b>Age</b>	.037	.023	.038	-.048	.097**	.022	.030
<b>BMI</b>	.017	.135**	-.072*	.037	.028	.075*	.036
<b>BSQ Total</b>	.240**	.373**	.242**	.379**	.410**	-.017	.446**
<b>DASS-21-Depression</b>	.433**	.434**	.426**	.474**	.547**	-.364**	.600**
<b>DASS-21-Anxiety</b>	.424**	.427**	.405**	.441**	.465**	-.154**	.556**
<b>DASS-21-Stress</b>	.443**	.401**	.375**	.531**	.496**	-.143**	.579**
<b>DEBQ-Emotional</b>	.291**	.281**	.247**	.379**	.344**	-.035	.401**
<b>DEBQ-External</b>	.145**	.126**	.143**	.324**	.135**	.043	.240**
<b>EBQ-18 Total</b>	.313**	.389**	.334**	.372**	.370**	-.102*	.469**
EBQ-18-Positive	.339**	.315**	.304**	.340**	.372**	-.061	.426**
EBQ-18-Negative	.269**	.409**	.288**	.382**	.375**	-.085	.464**
EBQ-18-Permissive	.143**	.213**	.206**	.165**	.128**	-.098	.230**
<b>EDBQ Total</b>	.490**	.548**	.408**	.493**	.560**	-.246**	.640**
EDBQ-Negative	.541**	.531**	.495**	.523**	.622**	-.334**	.693**
EDBQ-Self-acceptance	.195**	.313**	.252**	.391**	.367**	-.029	.423**
EDBQ-Other-acceptance	.274**	.484**	.291**	.379**	.428**	-.108*	.502**
EDBQ-Eating Control	.249**	.510**	.307**	.338**	.445**	-.133**	.505**
<b>EDE-Q Global</b>	.239**	.399**	.231**	.329**	.413**	-.063	.434**
EDE-Q-Restraint	-.022	.265**	.110**	.168**	.253**	.098	.249**
EDE-Q-Eating	.260**	.428**	.236**	.308**	.430**	-.004	.441**

Concern							
EDE-Q-Weight Concern	.148**	.381**	.204**	.300**	.366**	.044	.395**
EDE-Q-Shape Concern	.256**	.372**	.250**	.354**	.416**	-.141**	.441**

*Note.* BMI = Body Mass Index; BSQ = Body Shape Questionnaire; DASS-21 = Depression Anxiety Stress Scale 21; DEBQ = Dutch Eating Behaviour Questionnaire; EBQ-18 = Eating Beliefs Questionnaire 18; EDBQ = Eating Disorder Beliefs Questionnaire; ED = Eating Disorder; ED-CBQ = Eating Disorder Core Beliefs Questionnaire; ED-CBQ-SF = Eating Disorder Core Beliefs Questionnaire Short Form; ED-CBQ-R = Eating Disorder Core Beliefs Questionnaire Revised; EDE-Q = Eating Disorder Examination Questionnaire; SD = Standard Deviation.

\* $p < .05$  (two-tailed). \*\* $p < .01$  (two-tailed).

**Table 8** *Descriptive Statistics for the ED-CBQ, ED-CBQ-SF and ED-CBQ-R in the Full Sample, ED and non-ED Subgroups*

	<b>Full Sample</b> <b>(N = 763)</b>	<b>ED subgroup</b> <b>(n = 384)</b>	<b>Non-ED subgroup</b> <b>(n = 379)</b>	<i>t</i>	<i>p</i>	<i>d</i>
<b>Total ED-CBQ Mean (SD)</b>	3.04 (0.82)	3.29 (0.84)	2.78 (0.71)	9.00	< .001	.65
Self-Loathing Mean (SD)	1.85 (1.08)	2.17 (1.25)	1.52 (0.76)	8.59	< .001	.62
Unassertive Mean (SD)	3.04 (1.13)	3.26 (1.08)	2.82 (1.14)	5.46	< .001	.40
Demanding Mean (SD)	3.23 (1.19)	3.54 (1.22)	2.92 (1.07)	7.57	< .001	.55
Abandoned Mean (SD)	2.82 (1.37)	3.29 (1.42)	2.34 (1.13)	10.18	< .001	.74
High Standards for Self Mean (SD)	4.39 (1.05)	4.40 (1.05)	4.39 (1.06)	0.29	.775	.02
<b>Total ED-CBQ-SF Mean (SD)</b>	3.05 (0.84)	3.32 (0.86)	2.78 (0.73)	9.41	< .001	.68
Self-Loathing Mean (SD)	1.75 (1.19)	2.07 (1.40)	1.42 (0.81)	7.82	< .001	.57
Unassertive Mean (SD)	3.12 (1.37)	3.38 (1.30)	2.86 (1.38)	5.37	< .001	.39
Demanding Mean (SD)	3.45 (1.40)	3.82 (1.42)	3.07 (1.28)	7.66	< .001	.56
Abandoned Mean (SD)	2.45 (1.46)	2.94 (1.56)	1.95 (1.16)	9.99	< .001	.72
High Standards for Self Mean (SD)	4.78 (1.38)	4.63 (1.42)	4.93 (1.33)	3.02	.003	.22
<b>Total ED-CBQ-R Mean (SD)</b>	2.71 (1.05)	3.06 (1.08)	2.35 (0.89)	9.94	< .001	.72

*Note.* *t*-values indicates the difference in scores between the ED and non-ED subgroups. ED = Eating Disorder; ED-CBQ = Eating Disorder Core Beliefs Questionnaire; ED-CBQ-SF = Eating Disorder Core Beliefs Questionnaire Short Form; ED-CBQ-R = Eating Disorder Core Beliefs Questionnaire Revised; SD = Standard Deviation. Scores ranged from 1 to 7, with higher scores indicating higher endorsement of each subscale.

**Table 9** Results from ROC Curve Analyses for the ED-CBQ, ED-CBQ-SF and ED-CBQ-R

Scale	Cut-off Score	Sensitivity (95% CI)	Specificity (95% CI)	PPV (95% CI)	NPV (95% CI)	AUC (95% CI)
<b>ED-CBQ Total</b>	>2.875	69.01 (64.1-73.6)	59.37 (54.2-64.4)	63.20 (60.0-66.4)	65.40 (61.4-69.2)	0.680** (0.645-0.713)
Self-loathing	>1.7	51.04 (45.9-56.1)	75.73 (71.1-80.0)	68.10 (63.5-72.3)	60.40 (57.6-63.2)	0.674** (0.639-0.707)
Demanding	> 3.8	44.79 (39.7-49.9)	79.95 (75.6-83.9)	69.40 (64.3-74.0)	58.80 (56.3-61.3)	0.651** (0.616-0.685)
Unassertive	>2.625	69.79 (64.9-74.3)	47.76 (42.6-52.9)	57.50 (54.6-60.3)	60.90 (56.5-65.2)	0.609** (0.573-0.643)
Abandoned	>2.75	57.29 (52.2-62.3)	73.61 (68.9-78.0)	68.70 (64.6-72.7)	63.00 (59.9-66.0)	0.696** (0.662-0.728)
High Standards for Self	>3.5	80.99 (76.7-84.8)	23.22 (19.1-27.8)	51.70 (49.8-53.5)	54.70 (47.8-61.4)	0.507 (0.471-0.543)
<b>ED-CBQ-SF Total</b>	>3.055	62.24 (57.2-67.1)	67.28 (62.3-72.0)	65.80 (62.1-69.4)	63.80 (60.3-67.1)	0.688** (0.654-0.721)
Self-loathing	>1.25	51.04 (45.9-56.1)	73.88 (69.1-78.2)	66.40 (61.9-70.7)	59.80 (57.0-62.6)	0.646** (0.611-0.680)
Demanding	>3.75	51.82 (46.7-56.9)	72.3 (67.5-76.7)	65.50 (61.1-69.6)	59.70 (56.8-62.6)	0.654** (0.619-0.688)
Unassertive	>2.75	64.32 (59.3-69.1)	52.51 (47.3-57.6)	57.80 (54.7-61.0)	59.10 (55.2-63.1)	0.607** (0.571-0.642)
Abandoned	>2.33	55.73 (50.6-60.8)	77.57 (73.0-81.7)	71.60 (67.2-75.6)	63.40 (60.4-66.2)	0.689** (0.655-0.711)
High Standards for Self	≤4	35.94 (31.1-41.0)	74.93 (70.3-79.2)	59.20 (53.8-64.4)	53.60 (51.2-55.9)	0.562* (0.526-0.597)
<b>ED-CBQ-R Total</b>	>2.8	59.11	71.77	68.0	63.4	0.693**

(54.0-  
64.1)

(66.9-  
76.2)

(63.9-  
71.8)

(60.2-  
66.5)

(0.659-0.726)

*Note.* Analyses were conducted using the ED ( $n = 384$ ) versus non-ED ( $n = 379$ ) subgroups. Scores ranged from 1 to 7, with higher scores indicating higher endorsement of each subscale. AUC = Area under the curve; CI = Confidence Interval; ED = Eating Disorder; ED-CBQ = Eating Disorder Core Beliefs Questionnaire; ED-CBQ-SF = Eating Disorder Core Beliefs Questionnaire Short Form; ED-CBQ-R = Eating Disorder Core Beliefs Questionnaire Revised; NPV = Negative predictive value; PPV = Positive predictive value; ROC = Receiver operating characteristic curve. \*\* $p < .001$ .

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [SupplementaryDocument1.docx](#)
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