

On the Organisational Structure of the Popular Emotion Regulation Measures and its Value in
Classifying Eating Disorders and Predicting Symptom Severity

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Abstract

The current questionnaire study aims to 1) explore organisational structure of ERQ, DERS, TAS, UPPS-Negative Urgency and Belief about Emotion Controllability; 2) examine its utility in predicting the diagnosis of ED and its subtypes; 3) investigate whether this model equally explains the ED-related symptom severity among ED, its subtypes and community sample. A total of 650 completed responses was recorded (Female: N=449; Male: N=144; Prefer Not to say: N=52; Other: N=5). The age of the participants ranges from 16 to 73 ($M=23.32$, $SD=8.58$). It was found that DERS (except for the Awareness-subscale), TAS and UPPS measure are underlay by the same ER component, whereas ERQ's adaptive and maladaptive dimensions, and Belief about Emotional Controllability measured three unique ER component. The four extracted components: Emotion Dysregulation, Inattention to Emotional Experience, Non-use of Adaptive ER strategies and Implicit Belief about Emotion Malleability accounted for 76.43% of the total variance. The dysregulation and belief component both predicted the diagnosis of ED and symptom severity among the community sample, independent of depression and anxiety, highlighting their needs for prioritised clinical focus. The dysregulation component also discriminated ED subtypes. However, such an effect disappeared when depression is controlled. Although the findings are largely consistent with the trans-diagnostic perspective, further research that focuses on the emotion dysregulation and depression is necessary prior to concluding on the need for differentiated treatments among subtypes.

Keywords: Emotion Regulation, Eating Disorder, Psychometrics, Symptom Severity

On the Organisational Structure of the Popular Emotion Regulation Measures and its Value in Classifying Eating Disorders and Predicting Symptom Severity

Recently, an increasing amount of research attention has been devoted to emotion regulation (ER) and its relevance in disordered eating behaviour. The term ER refers to the ability to modulate the intensity and/or the duration of emotional experience according to situations (Gratz & Roemer, 2004). The eating disorder (ED) include three subtypes: Anorexia (AN), Bulimia Nervosa (BN), Binge Eating Disorder (BED) which are respectively characterised as excessive body image concerns resulted from restricted energy intake, unrestrained food consumption with, and without compensatory behaviours (American Psychiatric Association, 2013).

The General Relationship between ER and ED.

The relationship between ER and symptoms of BN and BED has been conceptualised differently by three major theoretical models: Escape Theory (Heatherton & Baumeister, 1991), Restraint Theory (Polivy & Herman, 1985) and Affect Regulation Theory (Hawkins & Clement, 1984), specifically regarding the role of ER in maintaining disordered eating behaviours. Despite such a disagreement, all three models posited that unregulated negative emotion serves as a trigger for binge eating episodes. Such a proposition has been widely supported by methodologically diverse research paradigms. A meta-analysis of naturalistic observation studies suggested that compared to their average level, both BN and BED patients showed elevated levels of negative affect prior to binge eating (Haedt-Matt & Keel, 2011). This finding was corroborated by Leehr et al. (2015) who conducted a systematic review of experimental findings on BED patients, highlighting patients' tendency to engage in binge eating in response to experimentally induced negative emotion.

Regarding AN, the transactional model proposed by Haynos and Fruzzetti (2011) postulates that engagement in eating-disordered behaviours is negatively reinforced by its resulting brief escape from aversive emotional experience. This model has received preliminary empirical support. In a naturalistic observation study, AN patients were found to experience significant increase in the level of negative affect prior to losing control of eating, while a marked decrease after consuming fluids for appetite control; thus suggesting the potentially crucial role of unregulated negative emotion in triggering disordered-eating behaviours among AN patients (Engel et al., 2013). Taken together, evidence from naturalistic, experimental and self-report studies have demonstrated the critical role of ER in developing ED symptoms among AN, BN and BED patients. This emphasises the importance of examining ER factors in all ED subtypes. The following section discusses the specific facets of ER and its relationship to each ED subtype in the context of the Multidimensional Framework proposed by Gratz and Roemer (2004).

Multidimensional Frameworks of Emotion Regulation.

Within the Multidimensional framework, ER is categorised into four dimensions: Understanding and Awareness of Emotions; Ability to Maintain Goal-directed Behaviours; Emotional Acceptance; and Access to Situationally Appropriate ER Strategies. Despite its popularity, limited is known about how the four dimensions are related to the wide range of existing ER measures. Studies reviewed in the following sections are arranged within the Multidimensional framework in a manner aligned with the only organisational structure available (Lavender et al., 2015).

The first dimension is often discussed under the term Alexithymia, the impaired ability to identify and describe one's emotional states (Taylor, Bagby and Parker, 1992), which is directly

measured using the Toronto Alexithymia Scale (TAS; Taylor et al., 1992). Other closely related measures are Difficulties in Emotion Regulation Scale (DERS; Gratz and Roemer, 2004), the Awareness and Clarity subscales. Findings of self-report studies uniformly demonstrate more significant deficits in emotional awareness among AN, BN (Bydlowski et al., 2005; Harrison et al., 2010) and BED patients (Svaldi et al., 2010) compared to healthy controls (HC). Studies on the second dimension primarily focus on the concept of impulse control - often measured using the DERS Impulse and Goal subscales, and the UPPS Impulsive Behaviour subscale (Whiteside & Lynam, 2001). Similarly, compared to HC, all ED subtypes have reported significantly higher level of impulsivity and disturbances in goal-directed activities than HC (Harrison et al., 2010; Schag et al., 2013). For the third dimension, the lack of emotional acceptance is intrinsically linked to maladaptive ER strategies, emotion avoidance and suppression. This dimension is frequently measured using the DERS Non-acceptance subscale and the Emotion Regulation Questionnaire (ERQ, Gross & John, 2003) Suppression subscale. Greater difficulties in Emotional Acceptance have been reported for AN, BN (Harrison et al., 2009; Oldershaw et al., 2012) and BED (Brockmeyer et al., 2014) when compared to HC. The last dimension directly relates to the adaptive element of ER which is often measured with the DERS Limited Access to Effective Strategies subscale, and the ERQ Cognitive Reappraisal subscale. Similar to the maladaptive ER component, previous studies using these two scales show increased deficits in adaptive strategies among all ED subtypes (Harrison et al., 2010; Svaldi et al., 2012). Taken together, AN, BN and BED patients all demonstrate elevated difficulties across all four domains within the Multidimensional ER framework. Despite such a consensus, it still remains poorly understood whether and how such ER functioning profiles differ across ED subtypes. The next

section provides a synthesis of existing research on this issue and clarifies the gaps in understanding that the current research aims to address.

Specificity of Emotion Regulation Difficulties across Eating Disorder Subtypes

Within the Multidimensional framework, the few studies simultaneously comparing the presence of ER difficulties across subtypes yielded mixed findings. Regarding the Emotional Awareness dimension, no statistically significant difference was found between AN and BN patients when treating Alexithymia as a categorical variable (Corcos et al., 2000). However, when treated as a continuous variable using total TAS scores, AN diagnosis was significantly associated with higher levels of Alexithymia. Nevertheless, this relationship disappeared after controlling for depression. Such a confounding effect was replicated by Eizaguirre et al. (2004) who found that when adjusting for comorbid depression and anxiety levels, differences among ED subtypes and HC failed to remain significant. However, when using a different controlling method involving participants without clinical depression and anxiety, the Alexithymia rate appeared higher in the ED group. Thus, the results might be partly attributed to the different methods of covariate adjustments. Nonetheless, such influences were not specified regarding the potential differential Alexithymia levels among ED subtypes - leaving the specificity of their emotional functioning profile of the first dimension under-examined. Regarding the impulse control dimension, a study which used neuropsychological tests found inhibitory control impairment and elevated impulsive decision-making in BN (Kemps & Wildsdon, 2010) but not in BED (Duchesne et al., 2010). However, this difference was not replicated in a self-report study where no significant difference in DERS impulsivity subscale scores was found among ED subtypes (Svaldi et al., 2012). Regarding the Emotional Acceptance dimension, no significant differences in scores on the DERS Emotional Acceptance subscale were found among AN, BN

and BED patients (Svaldi et al., 2012; Brockmeyer et al., 2014). In contrast, when measured differently, using the ERQ Emotion Suppression subscale, AN patients reported more frequent uses of emotion suppression than those with BN and BED, indicating an elevated level of difficulty in emotional acceptance (Danner et al., 2014). Therefore, it appears that different measurements of the same construct yielded differing results, casting doubt on the extent to which the measurements and the four ER dimensions are linked in a manner suggested by Lavender et al. (2015). It is also worth noticing that, in this study, AN was associated with higher depression levels than other subtypes. This raises the possibility of such differences being partly attributed to the effect of uncontrolled depression covariate. The same explanation could also apply to inconsistent results for the last dimension, access to adaptive ER strategies, where both Danner et al. (2014) and Brockmeyer et al. (2014) failed to replicate the more adaptive pattern among BED patients reported by Svaldi et al. (2012). This problem might be due to the inherent difficulties in controlling for covariate in between-group comparison studies. As raised by Miller and Chapman (2001), the use of analysis of covariance is only legitimate when the mean for covariance is identical across comparison groups, which however, does not hold true for the varying depression and anxiety levels among ED subtypes. Therefore, studies should move beyond the between-group comparison design if the proposed covariates were to be stringently controlled.

Emotion Regulation and Symptom Severity across Subtypes

It should be noted that the above studies only treated ED subtypes as group variables. This inevitably overlooked how their symptom severity might be differentially influenced by each ER variable. Racine and Wildes (2013) attempted to address this issue by examining the contribution of each DERS subscale to the levels of symptom severity among AN patients using

a hierarchical regression model. In this study, only the Awareness subscale emerged as a significant predictor, which led the authors to conclude its superior influence over the ER functioning domains measured by the rest five subscales. However, it is important to note that these five subscales were shown to be highly intercorrelated. Inputting them simultaneously in one step is likely to introduce multicollinearity, which consequently reduces the statistical power of the individual predictors. Therefore, to what extent such results could be interpreted as evidence for the superior contribution of emotional awareness remains unknown. The same methodological problem arises in the context of BN and BED, where the findings are contaminated by the multicollinearity effect that was introduced when DERS subscales were treated as separate independent variables. Despite this, when examined as a single construct, the total DERS score was also shown to predict overall symptom severity for BN (Lavender et al., 2014) and BED (Gianini et al., 2013), with the latter's effect above and beyond gender and negative affect.

In short, it appears that splitting the DERS by its subscales is not a viable way of examining the independent contribution of each ER domain. Research should, therefore, simultaneously include other ER measures, if a comprehensive account of ER-ED relationship was to be provided. This is especially important considering that identifying the most relevant ER variable for each ED subtype could have significant implications in prioritising clinical treatment focus.

To address the aforementioned limitations, the current research aims to extend the literature in three ways. First, the study aims to understand whether the organisational structure of a comprehensive range of ER measures: ERQ, DERS, TAS, UPPS-Impulsivity, and Belief about Emotion Controllability Scale, align with the Multidimensional framework in the way

suggested by Lavender et al (2015). Second, based on the structure identified, the study aims to examine a) how each ER component uniquely as well as collectively contributes to the diagnosis of AN, BN, BED and ED, b) whether this model equally explains symptom severity among the community sample and patients with AN, BN, BED and ED.

Method

Participants

The participants for the current study were recruited as part of a collaboration with other students at UCL and Bournemouth University. Eligibility criteria required individuals to be 16 or above, able to respond to the measures in English, and have access to the internet. A total of 850 participants was recruited through convenience and opportunity sampling without any incentives. Excluding responses with missing values in key variables, 650 cases remained. The age of the participants ranges from 16 to 73 ($M=23.32$, $SD=8.58$). The gender and ethnicity information are presented in Table 1.1. All data was obtained with informed consent. The study was approved by the ethics committee of University College London.

Design

The current quantitative questionnaire study adopts a cross-sectional and correlational design.

Table 1.1
Demographic Statistics

		N	Percentage
Gender	Female	449	69.07%
	Male	144	22.15%
	Prefer Not to Say	52	8.00%
	Other	5	.77%
Ethnicity	Caucasian	286	44.00%
	Asian	168	25.84%
	Black	11	1.69%
	Others	185	28.46%

Measures

Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004):

This 36-item self-report measure was used to assess ER capacity. On a five-point Likert scale, participants are asked to rate how often their personal experiences are congruent with the item descriptions, which are divided into the following six subscales.

1. Non-acceptance of emotional states (Acceptance): The tendency to have secondary response to one's own negative emotions
2. Lack of emotional clarity (Clarity): Lack of knowledge about one's own emotions
3. Lack of emotional awareness (Awareness): Difficulties in acknowledging and attending to one's own emotions
4. Impulse control difficulties (Impulse): Difficulties associated with remaining in control of behaviour when experiencing negative emotions

5. Difficulties with goal-directed activities when experiencing emotional distress (Goal):
Difficulties concentrating and accomplishing task when experiencing negative emotions
6. Limited access to effective ER strategies (Strategies): Beliefs that once upset, one will not be able to regulate the emotions.

The internal consistencies of the DERS were assessed using Cronbach's α that ranges from zero to one, with one indicating perfect consistency and vice versa. The current study demonstrated an excellent internal consistency ($\alpha = .96$), which is higher than that of the previous study ($0.72 \leq \alpha \leq 0.92$; Brockmeyer et al., 2014).

Emotion Regulation Questionnaire (ERQ, Gross and John, 2003):

This modified version of ERQ contains 16 items that measures the dispositional use of four ER strategies: avoidance, expressive suppression, cognitive reappraisal, and attentional distraction. Participants are required to indicate how much does each statement apply to themselves on a seven-point Likert-scale, with one being 'strongly disagree; and seven being 'strongly agree'. The internal consistency of ERQ was good in both current ($\alpha=.82$) and previous study ($0.78 \leq \alpha \leq 0.86$; Svaldi et al., 2012).

Toronto Alexithymia Scale (TAS, Taylor et al., 1992):

The level of alexithymia is measured using the 20-item TAS, which was further divided into three subscales: Difficulty identifying feelings (DIF), Difficulties describing feelings (DDF), Externally oriented thinking (EOT). Participants responses were recorded on a five-point Likert scale with one being strongly disagree. The scale demonstrated a good internal consistency with $\alpha=.81$, which is higher than the one found in Bydlowski et al. (2005)'s study ($\alpha=.70$).

UPPS, Negative Urgency subscale (Whiteside & Lynam, 2001):

This 12-item measure was used to assess the tendency to act rashly when faced with negative affect. The rest three subscales are excluded as it is considered irrelevant to the ER variables of interest. Based on statements that describe ways in which people act and think, participants rate their level of agreement on a Likert-scale from one (agree strongly) to four (disagree completely). The internal consistency in the current sample is .75, which is lower than the one reported by Whiteside et al. (2005) ($\alpha=.89$)

Belief about Emotion Controllability (De Castella et al., 2013):

The eight-item self-report measure is used to assess the general and personal beliefs about the malleability of emotions. Example statements regarding the two types of beliefs are “The truth is, people have very little control over their emotions” and “I can learn to control my emotions”. Responses are recorded on a five-point Likert scale ranging from “Strongly Disagree” to “Strongly Agree”. In the current sample, the internal consistency of this measure is 85.8%, which is higher than the one generated in the previous studies ($\alpha=.77$; De Castella et al., 2013).

Depression, Anxiety and Stress Scale (DASS-21; Lovibond & Lovibond, 1995b):

This 21-item measure consists of three subscales: depression, anxiety and stress (seven items per subscale). Participants indicate how much each statement applied to them over the past week on a four-point Likert scale (1: Never, 4: Almost always). Only depression and anxiety scores are used in the current study due to their relevance in previous research. Such scores are computed by summing their corresponding subscale scores and multiplying them by two. The internal consistency in this study was good for the total ($\alpha=.95$) and depression ($\alpha=.92$) and anxiety ($\alpha=.85$) subscales scores, which is also comparable to the ones reported by Harrison et al. (2010) (total: $\alpha=.92$; depression: $\alpha=.92$; anxiety: $\alpha=.82$).

The Eating Disorder Examination Questionnaire (EDE-Q; Fairburn and Beglin, 1994):

The 36-item EDE-Q consists four subscales: restraint scale, eating concern scale, weight concern scale and shape concern scale. In addition to these four subscales, it also includes questions about weight, height and the frequency of their purging and bingeing related behaviours. Items used for evaluating the presence of AN, BN and BED are selected based on the EDE scoring guide and DSM-V (American Psychiatric Association, 2013). Symptom severity is measured based on the global score which is calculated by averaging across the four subscales. The items responses are constrained within the past 28 days and scored based on a seven-point scale. Similar to the excellent internal consistency ($\alpha=.97$) published by Svaldi et al. (2012), the Cronbach's α of the current sample is .962.

In addition to the above seven established scales, demographic questions regarding gender, age, ethnicity, years of education and recruitment channels are also included. Please refer to Appendix B for the full questionnaire.

Procedure

Prior to distributing the questionnaire, the clarity of all questionnaire items was tested through a pilot study. The questionnaire instructions were amended based on the ambiguities identified. During the administration phase, participants were first presented with an information sheet detailing the research questions, the potential risk of feeling discomfort, the data anonymity and confidentiality, and their right to withdraw at any stage of the study. The questionnaire items are only presented after informed consent is obtained. Upon completing all questions, a debrief form is provided to signpost participants to source of emotional support. All above steps were

carried out online on Qualtrics. All data are stored on personal computer as encrypted and password protected excel files which was later imported into RStudio for data analysis.

Analytical Plan

The first subset of dependent variables include diagnosis of AN, BN, BED and ED in general which are considered categorical. The second subset includes the levels of ED-related symptom severity among patients with AN, BN, BED, ED and the entire community sample, which are considered numerical. The independent variables are the components scores extracted from the five emotional functioning measures.

A series of data cleaning procedures are first carried out to prepare the data for the later analyses. This include standardising units in weight and height columns to calculate BMI scores, reverse coding item responses such that higher the response scores indicates greater the emotional functioning difficulties, classifying AN, BN, BED based on EDE-Q scoring guidelines and DSM-V, creating a ED dummy variable to represent the presence or absence of ED, creating composite symptom severity variable based on EDE-Q scores, and depression and anxiety variables based on DASS scores.

At the exploratory data analysis stage, a distribution plot is generated to examine the normality of the ED-related symptom severity score. Then one-way ANOVA and Pearson or Spearman's rank-order correlation (depending on the distribution pattern of the covariates) are carried out to explore the confounding effect of depression and anxiety in relationship to the dependent variables: presence of AN, BN, BED and levels of ED related symptom severity.

At the main analysis stage, a polychoric correlation matrix of all item responses of interest is first computed to account for the ordinal nature of Likert-scale data. Principal component analysis is then carried out based upon such a matrix to extract the key components

from a battery of emotional functioning measures. The resulting eigen vectors matrix of the extracted components is multiplied by the centred and standardised original item response to generate the component scores for each participant. Such component scores are then treated as the independent variables in the following regression models. Next, Pearson or Spearman's rank-order correlation is carried out to examine the relationship between the proposed confounding variables and the extracted ER components. Nested logistic regressions are performed to examine the independent contribution of each ER component in predicting the likelihood of being classified as having AN, BN, BED and ED in general while controlling for levels of depression and anxiety. With the same independent variables, hierarchical multiple regressions are carried out to investigate whether such models equally explain the ED related symptom severity among patients with AN, BN, BED, ED and the community sample.

Results

Exploratory Data Analysis

As shown in Figure 1.1, the continuous independent variable, ED related symptom severity score ($M=2.244$, $SD=1.653$) is positively skewed. A $\text{Log}(x+1)$ transformation was applied to improve the normality while adjusting for the zero values. As a result, the skewness dropped from .467 to -.214 and the data appear to be reasonably proximate to the normal distribution. Results of one-way ANOVA suggest that both depression ($F(3,646)=30.9$, $p<.000$) and anxiety ($F(3,646)=21.46$, $p<.000$) scores were statistically significantly different among AN ($n=33$), BN ($n=56$), BED ($n=24$) and healthy population ($n=537$). Patients with AN, BN and BED respectively scored 14.451, 7.784, 9.498 points higher than the healthy population on depression measure, and 9.766, 5.706, 6.741 points higher on anxiety measure. Tukey post hoc analysis revealed that the differences among ED subtypes were not statistically significant for both variables. Such results

suggest that the proposed confounding variables influence diagnosis of ED, yet such an effect is not robust enough to differentiate among ED subtypes. Regarding the continuous dependent variable, results of Spearman's rank-order correlation suggest that both depression and anxiety scores were positively and moderately correlated with levels of ED related symptom severity ($r(648) = .506, p < .0000$, $r(648) = .439, p < .0000$), supporting for the confounding effect of the covariates.

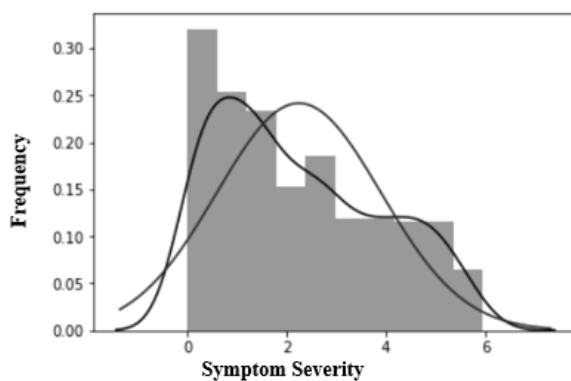


Figure 1.1

Distribution plot of symptom severity

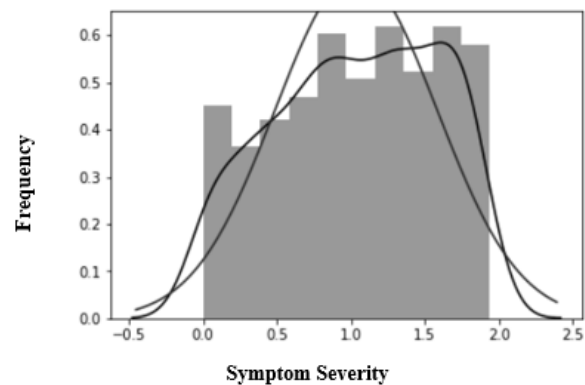


Figure 1.2

Distribution plot of log-transformed symptom severity

Main Analysis

1.Does the factor structure of the variables measured in ERQ, DERS, TAS and UPPS align with the multidimensional ER framework in the manner suggested by Lavender et al (2015)?

A Principal Components Analysis (PCA) was run on 92 questionnaire items that were derived from five emotional functioning measures. The suitability of PCA was validated by the high overall Kaiser-Meyer-Olkin (KMO) score ($KMO=.92$) and the significant Bartlett's Test of Sphericity ($p < .0005$).

Component Extraction:

Among the 92 components, the first four components respectively explained 45.99%, 15.87%, 8.03 and 6.35% of the total variance. The proportion variance of the fifth components dropped to 3.632% which is considered insufficient to be extracted. As shown in figure 2.1, a visual inspection of the scree plot also led to the same conclusion (Catell, 1966). The four-factor solutions explained 76.43% of the total variance. No rotation was employed as the standardised loadings have reasonable level of interpretability. For the loading score and communality value of each item, please refer to Table 1.2 in Appendix A. It is worth noticing that since almost all items in the first component have a negative loading score, a higher component score indicates a lower level of ER difficulties, whereas the opposite is true for the other three components.

As shown in Table 1.3 and 1.4, variances measured by DERS, ERQ, TAS, UPPS and Belief about Emotional Controllability scale could not be sufficiently captured by the Multidimensional framework in the manner suggested by Lavender et al. (2015). Specifically, instead of emerging as the four ER dimensions as proposed theoretically, the six DERS subscales collapsed under one component, with an exception of the Awareness subscale independently loaded on the second component. On the contrary, loading scores of ERQ items replicated the maladaptive-adaptive split proposed by Gross (1998)'s ER model, suggesting a stronger psychometric validity. Similarly, TAS also exhibits a pattern divergent from its original proposal. Specifically, half of the EOT subscale loaded on the second component with the other half failing to load on any of the four components, demonstrating questionable reliability. Since unreliable items are likely to misguide naming decisions and introduce noises in regression models, the

EOT subscale was excluded from the final component construction.

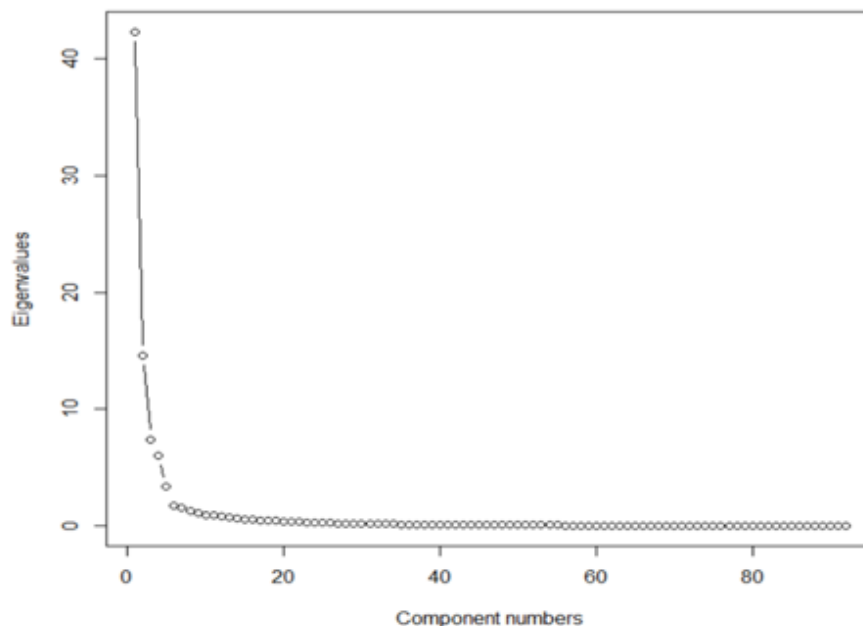


Figure 2.1 Scree Plot

Component Naming:

The ER areas covered by the first component could be broadly categorised as the inability to control impulses and engage in goal-directed activities, and the lack of emotional understanding. All of which seem to be the direct consequences and precursors of failing to regulate emotion, instead of the use or non-use of any ER strategies. Thus, the term ‘Emotion Dysregulation’ appears to be a reasonable summarisation of this component. Unlike the first component, the second component is strategy-based, and maladaptive in nature. Within this component, failure to attend to emotion appears to be not only, the very nature of the lack of emotional awareness, and the necessary step to suppress or avoid emotion. Therefore, ‘Inattention to Emotion’ is extracted as the common factor that best describes the second component. Similarly, the third component is also strategy-based, but adaptive in nature, hence the name ‘the Non-use of Adaptive ER Strategies.’ The fourth component is only consisted of the Belief about

Emotional Controllability scale. Therefore, the core component measured by this scale, ‘Implicit Beliefs about Emotion Malleability’ is used as its component name.

The relationship between the four ER components and the proposed confounding variables were assessed through Spearman’s rank-order correlation. As shown in table 1.3, depression was significantly and negatively associated with all components except PC3, whereas depression was only weakly associated with the second component. Together with its relationship with the ED classifications and symptom severity scores reported above, it is evident that the two covariates are likely to confound the relationship between at least one ER component and the dependent variables. Therefore, both of which were treated as confounding variables in the following regression models.

Table 1.3

Organisational Structure of ER Measures as Proposed by Lavender et al.(2015)

Lack of Emotional Awareness and Understanding	Inability to Maintain Goal-directed Behaviours When Distressed	Lack of Emotional Acceptance	Limited Access to effective ER strategies
DERS Non-acceptance	DERS Goal	Belief about Emotion Controllability Scale	DERS Strategies
DERS Clarity DERS Awareness TAS	DERS Impulse Control UPPS Impulsivity	ERQ Suppression	ERQ Cognitive Reappraisal

Table 1.4

Component Names and its Constituents

Emotion Dysregulation	Inattention to Emotional Experience	Non-use of adaptive ER strategies	Implicit Belief about Emotion Malleability
DERS Clarity DERS Non-acceptance DERS Goal DERS Impulse Control DERS Strategies UPPS Impulsivity TAS DIF TAS DDF	DERS Awareness ERQ Suppression ERQ Avoidance	ERQ Attentional Distraction ERQ Cognitive Reappraisal	Belief about Emotion Controllability Scale

Notes: Items with loading scores below 0.4 were excluded. These items include question 5, 20, 18, 16 in TAS EOT subscale. Item 17 in TAS DDF subscale was disregarded when constructing the components, as it was the only item in DDF subscale that loaded on the second component. The corresponding unabbreviated name of each subscale could be found in the method section above.

Table 1.5

Spearman's rho Correlations

		PC1	PC2	PC3	PC4
Depression	Correlation Coefficient	-.751**	-.165**	-.105	-.145**
	N	650	650	650	650
Anxiety	Correlation Coefficient	-.642	-.0875*	.036	.050
	N	650	650	650	650

*p<.005; **p<.0001

2. Whether and how does each of the emotion regulation components contribute to eating disorder related symptom severity among patients with AN, BN, BED, ED and the entire community sample?

Five hierarchical multiple regressions were run to examine the additional importance of each ER component in predicting the symptom severity in AN, BN, BED, ED and the entire community sample respectively. In each model, the hypothesised confounding variables: depression and anxiety, were entered at last to determine whether its addition would subsume the variances explained by the ER components. The independence of residuals assumption was met for all models, as the Durbin-Watson statistic of each model was approximate to 2.0 (AN: 2.42, BN: 2.14, BED: 2.3, ED: 2.07, Community: 1.73). There was no evidence of multicollinearity among the independent variables, as assessed by Variance Inflation Factor (VIF) < 2 . However, the potential covariate, depression and anxiety showed a level of multicollinearity, with the VIF value ranging from 1.86 to 2.39 and 2.175 to 3.03 respectively. There linearity and homoscedasticity assumptions were met as assessed by a plot of studentised residuals against the predicted values. The results of the BED model were not reported, as the model did not reach statistical significance at all stages and no independent variables emerged as a significant predictor.

As shown in Table 2.1, all full models are statistically significant except for BN. Addition of the first component led to a statistically significant increase in the amount of variance explained in all groups. However, its predictive power for symptom severity among AN disappeared when the second component was added to the model. It did remain as a significant predictor of symptom severity within BN sample until depression and anxiety were added to the model. Its predictive power appeared to be most robust for the community sample as it remained

significant even after controlling for the confounding variables. Such an effect was negative in direction and moderate in size, which means one unit increase in score of the first component is associated with a decrease in symptom severity of .302. Unlike the first component, neither did the second component predict symptom severity in any group nor its addition led to any significant increase in the amount of variance explained. Both the third and the fourth component predicted symptom severity within the community sample, but only the fourth component remained significant after the addition of the confounding variables. Although having reached statistical significance, the amount of variance explained by the two components was relatively small.

Table 2.1

Results of Hierarchical Regression Analyses of Predictors of Eating Disorder Related Symptom Severity Among within AN, BN, ED, and the Community Sample

Variables	Model 1 (PC1)				Model 2 (PC1+PC2)				Model 3 (PC1+PC2+PC3)				Model 4 (PC1+PC2+PC3+PC4)				Model 5 (PC1+PC2+PC3+PC4+Dep+Anx)			
	AN	BN	ED	Com	AN	BN	ED	Com	AN	BN	ED	Com	AN	BN	ED	Com	AN	BN	ED	Com
Step1: PC1	-.361*	-.284**	-.299**	-.517**	-.320	-.293*	-.322**	-.524**	-.250	.332*	-.327**	-.532**	-.252	-.341*	.334	-.537**	.118	-.132	-.135	-.302**
Step2: PC2					-.095	.055	.102	.049	-.107	.036	.100	-.044	-.110	.028	.092	-.038	-.095	-.011	.059	.037
Step3: PC3									-.217	.142	.021	.067*	-.236	.172	.025	.067*	-.262	.222	.027	.063
Step4: PC4													.073	.106	.082	-.095**	.337	.180	.164	.123**
Step5: Depression																	.533	.482*	.300	.270**
Anxiety																	.166	-.206	.03	.055
R ²	.131*	.081*	.097**	.267**	.138	.084	.099*	.269**	.181	.102	.100**	.274*	.186	.112	.106*	.283**	.386*	.194	.164**	.323**
ΔR ²					.007	.003	.010	.002	.043	.018	.000	.007*	.102	.010	.007	.009**	.065*	.082	.057*	.004**
F	4.653*	4.75**	10.9**	235.900**	2.398	2.425	6.063	119.2*	2.129	1.966	4.022	81.11*	1.594	1.614	3.473*	63.51*	2.727*	1.967	3.454	52.130**
ΔF					2.255	2.325	4.837	116.7	.266	.459	2.041	38.09*	.831	.352	.809	17.6**	1.133*	.353	.241	12.380**

*p<.005; **p<.001

Notes: All values are rounded up to three decimal places. The first five rows represent the standardized coefficients, Beta.

Abbreviations: AN, Anorexia; BN, Bulimia; ED, Eating Disorder; Com, Community (the entire sample); Dep, Depression; Anx, Anxiety

3. How does each of the emotion regulation component uniquely as well as collectively contribute to the presence of Anorexia, Bulimia, Binge Eating Disorder and Eating Disorder in general?

Four logistic regressions were first generated by adding the four ER components step by step to assess the additional model fit improvements resulted from each component. Depression and anxiety were then entered at last to assess their respective confounding effect. The same procedure was applied in predicting the presence of AN, BN, BED and ED in general. The model improvement of the additional variable was assessed based on the changes in residual deviance which is calculated as $-2 \times \log\text{-likelihood}$. Chi-square test was performed to examine if the changes reached statistical significance. As assessed via the Box-Tidwell (1962) procedure, all continuous independent variables were linearly correlated with the logit of dependent variables. Such an assessment was based on Bonferroni correction which was applied using 18 terms in the model resulting in statistical significance being accepted when $p < .00028$ (Tabachnick & Fidell, 2014). Based on the results of Hosmer and Lemeshow goodness of fit test, all models demonstrated good fitting except for the fourth AN model, the third BN model and the first BED model.

As shown in Table 2.2, model improvements followed by the addition of the first component reached statistical significance for all binary dependent variables. It also significantly predicted the AN, BN, BED and ED diagnosis likelihood across the first four modelling stages. However, such an effect did not remain statistically significant after adding depression and anxiety variables to the model. The second and third component neither emerged as significant predictors of all binary dependent variables nor their addition led to any statistically significant drop in residual deviance. On the other hand, the addition of the fourth component significantly

improved the fit of both BN and ED models. However, it only predicted the likelihood of being classified as having BN not ED in general. Interestingly, its predictive power in the ED model also reached statistical significance when depression and anxiety were entered.

Table 2.2

Results of Nested Logistic Regression Analyses of Predictors of the Presence of AN, BN, BED, and ED

Variables	Model 1 (PC1)				Model 2 (PC1+PC2)				Model 3 (PC1+PC2+PC3)				Model 4 (PC1+PC2+PC3+PC4)				Model 5 (PC1+PC2+PC3+PC4+Dep+Anx)			
	AN	BN	BED	ED	AN	BN	BED	ED	AN	BN	BED	ED	AN	BN	BED	ED	AN	BN	BED	ED
	OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI	OR 95%CI
Step1: PC1	.828** (.769-.893)	.873** (.818-.916)	.900* (.831-.976)	.841** (.804-.880)	.824** (.764-.888)	.866** (.818-.916)	.904* (.832-.981)	.836** (.799-.875)	.825** (.765-.891)	.862** (.813-.913)	.910* (.839-.988)	.837** (.799-.876)	.826** (.765-.891)	.854** (.805-.907)	.912* (.840-.991)	.833** (.795-.873)	.940 (.841-1.052)	.926 (.845-1.015)	.955 (.842-1.083)	.929* (.868-.994)
Step2: PC2					1.094 (.946-1.266)	1.117 (.997-1.252)	.948 (.807-1.115)	1.087 (.997-1.085)	1.095 (.947-1.266)	1.116 (.995-1.250)	.953 (.810-1.121)	1.087 (.997-1.085)	1.101 (.950-1.274)	1.090 (.972-1.223)	.957 (.813-1.126)	1.077 (.987-1.175)	1.092 (.942-1.265)	1.087 (.969-1.219)	.955 (.811-1.125)	1.075 (.983-1.175)
Step3: PC3									.977 (.829-1.152)	1.058 (.995-1.250)	.889 (.733-1.077)	.998 (.894-1.093)	.978 (.829-1.154)	1.056 (.926-1.205)	.887 (.731-1.077)	.988 (.893-1.092)	.964 (.811-1.146)	1.053 (.919-1.207)	.878 (.958-1.066)	.976 (.879-1.084)
Step4: PC4													.948 (.785-1.146)	1.285** (1.109-1.490)	.937 (.757-1.158)	1.118 (1.000-1.249)	.986 (.811-1.146)	1.309** (1.127-1.520)	.945 (.764-1.170)	1.157* (1.031-1.098)
Step5: Depression																	1.060* (1.012-1.110)	1.038* (1.000-1.078)	1.010 (.958-1.066)	1.049** (1.019-1.079)
Anxiety																	1.017 (.967-1.01)	1.007 (.966-1.050)	1.020 (.961-1.082)	1.018 (.986-1.051)
X ² (Hosmer and Lemeshow goodness of fit test)	5.512	8.340	16.098*	9.248	5.315	10.736	7.439	12.598	6.536	19.272*	10.806	12.481	16.881*	8.521	5.240	14.665	7.510	2.446	6.968	5.588
Nagelkerke R ²	.122	.080	.036	.154	.129	.092	.039	.163	.129	.094	.047	.163	.131	.132	.049	.171	.176	.150	.054	.214
-2 loglikelihood ratio	26.855*	23.415**	6.449*	63.445**	1.483	3.733	.411	3.605	.075	.716	1.453	.054	.301	11.370**	.366	3.868*	10.277**	5.574	.944	18.748**

*p<.005; **p<.001

Notes: All values are rounded up to three decimal places.

Abbreviations: AN, Anorexia; BN, Bulimia; BED, Binge Eating Disorder; ED, Eating Disorder; Dep, Depression; Anx, Anxiety; OR, Odd Ratio; CI, Confidence Interval

Discussion

The current research examined the latent organisational structure of the five popular ER measures: DERS, ERQ, TAS, UPPS-Impulsivity, and Belief about Emotion Controllability. Previously, Lavender et al. (2015) have attempted to organise the five measures within Gratz and Roemer's (2004) Multidimensional Framework. However, the current PCA results suggest that such a framework alone is insufficient to capture all the variances explained by the five ER measures. Specifically, the two dimensions: inability to maintain goal-directed behaviours when distressed and lack of emotional understanding, collapsed into a single Emotion Dysregulation component. The other two dimensions are relatively consistent with the two strategy-based components: Inattention to Emotional Experience and Non-use of Adaptive ER Strategies, and directly reflected the adaptive-maladaptive split that the ERQ was originally developed upon (Gross & John, 2003). However, instead of being a part of the strategy components, the implicit belief about emotion malleability constituted an independent ER component, providing the first evidence for its distinct empirical value that is beyond the popularly discussed ER dimensions.

Furthermore, the study also revealed some important insights regarding the psychometric properties of the individual measures. As shown in the PCA results, half of the TAS, EOT subscale did not load on any of the components, while the rest two subscales collapsed into one component. Such results extend the previous findings on the tendency of DIF and DDF to merge into a single construct and the low psychometric reliability of EOT subscale, to the context of eating disorders (Kooiman et al., 2002). This highlights the need to account for the highly correlated nature of the DIF and DDF subscales, and the potential benefit for future studies in excluding the EOT subscale.

Similarly, contrary to its original proposal, the DERS Goal, Impulse, Strategies, Clarity, Non-acceptance subscales clustered under one component while the Awareness subscales strongly loaded on a different component. Such results are consistent with those of Bardeen et al. (2012) who also found the highly intercorrelated nature of the five DERS subscales and their independence from the Awareness subscale. More importantly, in the current study, the component that Awareness subscale loaded onto failed to predict any of the ED related variables. This is reinforced by the similar findings where removal of Awareness subscale not only did not diminish the association between DERS and depression symptoms, but also increased its strength of association with the anxiety symptoms. Therefore, future research should be extra cautious when using the DERS measure, as directly using its global score with the Awareness subscale included, is likely to introduce additional noises into the data, thereby, leading to potentially misleading results.

Regarding the predictive power of the extracted ER components, the current research provides the first evidence for the robust relationship between individuals' belief about emotion controllability and three ED outcomes: the diagnosis likelihood of ED and BN, and ED-related symptom severity within the community sample. The belief component not only emerged as a stronger predictor than Emotion Dysregulation, such an effect was also above and beyond the influence of depression and anxiety. Such robust relationships could be potentially attributed to the domain-general nature of the implicit belief component. According to Tamir et al (2007), belief about emotion controllability is largely categorised into two types, entity belief and incremental belief. The two types differ in their degree of flexibility that is assigned to changes in emotion and their ability to bring about such changes, with the entity type associated with lower level of flexibility. It is important to note that belief about one's ability to modulate their

emotional experience constitutes only one facet of domain-general implicit beliefs about human attributes. Individuals who hold entity belief about their abilities to control emotions tend to have the same belief pattern about other attributes and are classified as entity theorists regarding the entire personal attribute domain (Molden & Dweck, 2006; Hughes, 2015). Entity theorists as such were shown to exhibit a more evaluative processing style while encoding personal and social cues which could potentially include information concerning weight and shape (Hong et al., 1997). Individuals who have stronger tendencies to impose evaluative tags are more likely to over-evaluate weight and shape, thereby increasing their likelihood of ED diagnosis. However, such an explanation is only based on indirect evidence, further research with a direct focus on the relationship between implicit belief and weight/shape concern is, therefore, suggested.

Apart from the belief component, the Emotion Dysregulation component also emerged as a significant predictor of ED-related symptom severity in the community sample and ED diagnosis likelihood. It also predicted symptom severity in AN, BN and ED groups when it was entered as the only variable in the model. This is consistent with the previous findings that reported a significant relationship between total DERS score and symptom severity levels among AN and BN patients (Racine & Wildes, 2013; Lavender et al., 2014). The current findings, however, extend this understanding, by demonstrating that such a relationship cease to remain significant after including other ER components, which highlights the need to include a comprehensive range of ER variables to avoid identifying any superfluous relationships. Surprisingly, the same component also discriminated AN, BN and BED in a clinically significant manner. However, such effects did not remain significant after the depression variable was included. In fact, apart from the belief component and its association with BN, none of the ER components examined independently classified any of the ED subtypes. Such patterns are

consistent with the findings that suggest the lack of statistically significant differences in DERS scores across ED subtypes, supporting the view of emotion dysregulation being trans-diagnostic across the spectrum of ED (Brockmeyer et al., 2014).

In contrast to the dysregulation and belief component, the two strategy-based components: Inattention to emotional experience and Non-use of Adaptive ER strategies, failed to predict any ED-related outcomes. On the surface, this finding seems inconsistent with the two previous findings: the meta-analytical results of the modest to small effect size between the use of ER strategies and ED (Aldao, Nolen-Hoeksema & Schweizer, 2010), and a statistically significant association between ED and a latent cognitive ER strategy component (Aldao & Nolen-Hoeksema, 2010). However, both studies did not consider the confounding effect of depression. Given that the strength of such associations was rather weak compared to other mood-related disorders, it is conceivable that when such relationships are unlikely to remain significant when the varying levels of depression are controlled. Therefore, the current findings support the general idea that the use of ER strategies are unlikely to be directly linked to ED.

The large sample size and its mixed demographics well positioned the current study to examine the organisational structure and the psychometric validity of the popular ER measures. The derived latent structure could be used to organise future systematic reviews. Relationships among ER measures detailed by such a structure also highlights the potential multicollinearity that future research should account for. Another key strength of the current study is its large coverage of ED spectrum and the use of two differentially operationalised ED outcomes. When combined with a large battery of ER measures, the study provides a highly comprehensive account for the possible relationships between ER and ED. An important implication of this advantage is its utility in helping clinicians prioritise their treatments efforts according to the

differential predictive power of the ER components. In this case, the two ER components; emotion dysregulation and belief about emotion controllability should receive prioritised attention. However, despite the large total sample size, findings of the current study are limited by its relatively smaller sample size within each subtype group. This limitation especially applies to the BED group, which might potentially explain its poor model fit as well as lack of significant results. Furthermore, these results are only based on English-speaking participants, mostly with Western background. To what extent such results could be generalised to the Eastern population remains unclear. Therefore, future research is encouraged to replicate such findings in a different cultural setting.

In summary, the use of ER strategy and belief about emotion controllability appear to be unique ER domains that cannot be captured by the Multidimensional framework. Furthermore, having validated some of the scepticisms around the psychometric properties of TAS and DERS, future studies are thus, encouraged to account for the low psychometric reliability of EOT subscale and the independence of DERS awareness subscale. In terms of clinical utility, belief about emotion controllability and emotion dysregulation, specifically, difficulties in impulse control and understanding emotion were shown to play a key role in ED. Therefore, clinical treatments that focused on these areas are likely to yield desirable results. Although the present findings generally support the trans-diagnostic perspective, emotion dysregulation did discriminate ED subtypes when depression was not accounted for. Therefore, it is important for future research to examine the potential interactions between depression and ER difficulties prior to concluding on the need for differentiated treatments among subtypes.

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Appendix A

Table 1.2

Unrotated Structure Matrix for PCA of Five Emotional Functioning Questionnaires

Items	Unrotated Component Coefficient (Standardised Loadings)				
	Component 1	Component 2	Component 3	Component 4	Communalities
ClarityDERS_1	-0.69025	0.59304	0.14278	-0.00906	0.848615
AwarenessDERS_2	-0.30243	0.789624	0.374227	-0.11551	0.868361
ImpulseDERS_3	-0.92268	-0.26289	-0.08888	0.005997	0.92839
ClarityDERS_4	-0.89692	0.259024	-0.06309	0.059453	0.879076
ClarityDERS_5	-0.9413	0.185625	-0.04743	0.046757	0.924937
AwarenessDERS_6	-0.21163	0.797405	0.400031	-0.11985	0.855033
ClarityDERS_7	-0.81648	0.404371	0.150284	-0.03181	0.853756
AwarenessDERS_8	-0.23273	0.805033	0.316848	-0.16095	0.82854
ClarityDERS_9	-0.93102	0.107935	-0.09297	0.095481	0.896217
AwarenessDERS_10	-0.23292	0.795717	0.388223	-0.113	0.850902
NonacceptDERS_11	-0.91237	-0.01225	-0.18984	0.121516	0.883369
NonacceptDERS_12	-0.89847	0.052551	-0.16735	0.135811	0.856464
GoalDERS_13	-0.76536	-0.33361	-0.28606	0.010483	0.779006
ImpulseDERS_14	-0.89782	-0.26046	-0.09444	-0.12558	0.898611
StrategiesDERS_15	-0.93485	-0.18084	-0.06854	0.134426	0.929412
StrategiesDERS_16	-0.92109	-0.18393	-0.07976	0.154001	0.912308
AwarenessDERS_17	-0.36349	0.665367	0.338826	0.026182	0.690324
GoalDERS_18	-0.71339	-0.4128	-0.25543	0.016364	0.74484
ImpulseDERS_19	-0.92363	-0.23574	-0.10627	-0.07127	0.925032
GoalDERS_20	-0.66311	-0.329	-0.07095	-0.1509	0.575754
NonacceptDERS_21	-0.89843	0.043388	-0.14957	0.140956	0.851306
StrategiesDERS_22	-0.84145	-0.03338	0.314004	0.068541	0.812446
NonacceptDERS_23	-0.91459	-0.05141	-0.14683	0.098239	0.870333
ImpulseDERS_24	-0.8148	-0.20651	0.044354	-0.24656	0.769303
NonacceptDERS_25	-0.8832	0.039586	-0.1542	0.174183	0.83573
GoalDERS_26	-0.76448	-0.35214	-0.27641	0.070814	0.789848
ImpulseDERS_27	-0.89445	-0.22916	-0.10619	-0.15724	0.888561
StrategiesDERS_28	-0.93288	-0.05609	0.025364	0.151929	0.897145
NonacceptDERS_29	-0.92105	-0.01448	-0.1514	0.122487	0.886477
StrategiesDERS_30	-0.93183	-0.10438	-0.15848	0.076483	0.91017
StrategiesDERS_31	-0.90666	-0.19319	-0.0616	0.111717	0.875636
ImpulseDERS_32	-0.90734	-0.20874	-0.06092	-0.10373	0.881306
GoalDERS_33	-0.81586	-0.35951	-0.25843	0.049375	0.864097
AwarenessDERS_34	-0.04642	0.622575	0.519734	-0.14299	0.680322
StrategiesDERS_35	-0.90285	-0.13509	-0.12984	0.169479	0.878962
StrategiesDERS_36	-0.91067	-0.2795	-0.16933	0.03419	0.937285
Distraction_ERQ_1	-0.15796	-0.09907	0.75925	0.03527	0.612471
Suppression_ERQ_2	-0.25792	0.82591	-0.13389	0.056537	0.76977
Distraction_ERQ_3	-0.35855	-0.24412	0.687525	-0.0393	0.662391
Avoidance_ERQ_4	-0.27727	0.440954	-0.2967	-0.00762	0.359409
Suppression_ERQ_5	-0.4284	0.666417	-0.09692	0.077396	0.643026
Avoidance_ERQ_6	-0.40351	0.740852	-0.27545	0.071137	0.792617

CogReap_ERQ_7	-0.63135	-0.20561	0.622124	-0.12663	0.843953
Suppression_ERQ_8	-0.31006	0.831991	-0.16476	0.164171	0.842445
CogReap_ERQ_9	-0.41344	-0.12791	0.79638	-0.1136	0.834421
Distraction_ERQ_10	-0.49878	-0.31358	0.684815	-0.11894	0.830235
CogReap_ERQ_11	-0.45615	-0.22834	0.747342	-0.07776	0.824785
Avoidance_ERQ_12	-0.47974	0.700004	-0.19981	0.093449	0.768815
Suppression_ERQ_1	-0.24511	0.797898	-0.19172	0.133161	0.751213
CogReap_ERQ_14	-0.50537	-0.15472	0.74221	-0.07194	0.835385
Distraction_ERQ_15	-0.2676	-0.50185	0.650629	-0.02614	0.74746
Avoidance_ERQ_16	-0.29106	0.34001	-0.53724	-0.04121	0.490649
UPPS_1	-0.78309	-0.28323	0.088406	-0.31746	0.802042
UPPS_2	-0.62428	-0.17219	0.028301	-0.37011	0.557163
UPPS_3	-0.72175	-0.1244	-0.01032	-0.39064	0.689107
UPPS_4	-0.78195	-0.23541	0.016344	-0.35629	0.79407
UPPS_5	-0.86446	-0.1976	0.013299	-0.30144	0.877392
UPPS_6	-0.81807	-0.24537	0.014727	-0.3923	0.883552
UPPS_7	-0.67313	-0.33124	-0.01386	-0.41457	0.734883
UPPS_8	-0.67283	-0.47836	-0.05316	-0.39896	0.843528
UPPS_9	-0.76944	-0.31584	-0.02628	-0.40581	0.857163
UPPS_10	-0.61334	-0.26173	0.037738	-0.47443	0.6712
UPPS_11	0.802285	0.345988	-0.03423	0.167736	0.792677
UPPS_12	0.824737	0.246879	-0.02087	0.32535	0.847429
Controllability_1	-0.2903	-0.13225	0.190638	0.587943	0.483782
Controllability_2	-0.28818	-0.07421	0.090217	0.780644	0.706099
Controllability_3	-0.22792	-0.28093	0.269626	0.730754	0.737567
Controllability_4	-0.28353	-0.09747	0.214496	0.684369	0.604258
Controllability_1.1	-0.56074	-0.17955	0.233561	0.562118	0.717196
Controllability_2.1	-0.43937	-0.25618	0.21177	0.709254	0.806559
Controllability_3.1	-0.4221	-0.27568	0.256632	0.699592	0.809459
Controllability_4.1	-0.75885	-0.17263	0.035807	0.444805	0.804788
DIF_TAS_1	-0.89719	0.233665	-0.02541	0.056523	0.863382
DDF_TAS_2	0.846389	-0.43284	0.022119	-0.05159	0.906881
DIF_TAS_3	-0.77874	0.143088	-0.10562	0.098718	0.647813
DDF_TAS_4	-0.7946	0.450852	0.031197	0.064663	0.83981
EOT_TAS_5	0.272867	0.107119	0.109422	0.053404	0.100756
DIF_TAS_6	-0.8969	0.172164	-0.05123	-0.07867	0.842887
DIF_TAS_7	-0.81108	0.154089	-0.13888	-0.00795	0.700936
EOT_TAS_8	-0.00434	0.664349	-0.1958	-0.11918	0.49392
DIF_TAS_9	-0.89449	0.208956	-0.04766	0.143746	0.866718
EOT_TAS_10	-0.24263	0.750243	0.35505	-0.15406	0.771527
DDF_TAS_11	-0.77492	0.409238	-0.05498	0.074663	0.776574
DDF_TAS_12	-0.60968	0.617379	-0.10539	0.098301	0.773632
DIF_TAS_13	-0.94803	0.163851	-0.07271	0.105855	0.942106
DIF_TAS_14	-0.91537	0.150619	-0.07565	-0.08832	0.874107
EOT_TAS_15	-0.11432	0.741538	-0.00153	-0.15106	0.585771
EOT_TAS_16	0.04517	0.029537	-0.30344	-0.34376	0.213164
DDF_TAS_17	-0.60666	0.652378	-0.10339	-0.05763	0.807642
EOT_TAS_18	-0.2025	0.320179	0.307761	-0.15293	0.261624
EOT_TAS_19	-0.0355	0.653448	0.509795	-0.16366	0.714929
EOT_TAS_20	-0.189	0.280089	-0.1271	-0.11152	0.142762

Eating Disorder and Emotional Functioning Questionnaire

If you are happy to participate in this study after reading the information sheet, please complete this consent form:

Yes No

I have read and understood the information leaflet about the research. ☐ ☐

I agree to participate by completing the questionnaire on emotional functioning, well-being and mental health. ☐ ☐

I understand that the completed questionnaire will be kept confidential and the data will not be attributed to me nor shared outside the research team. ☐ ☐

I understand that I can withdraw from the project at any time, and that if I choose to do so, any data I have contributed will be destroyed and not used. ☐ ☐

I understand that I may retrospectively ask for my data to be destroyed and not used in the project. ☐ ☐

I understand that I can contact the researcher or Dr. Amy Harrison at any time if I have questions. ☐ ☐

Name _____

Signed _____

Date _____

Student researchers: Meilin Lai

Supervisor: Dr. Amy Harrison (a.harrison@ucl.ac.uk)

Thank you for your participation. The following sections will include questions on topics such as demographic information, emotion functioning, depression and anxiety and eating disorder. We appreciate your time and please circle the response that is most relevant to you.

Demographic information

1.GENDER: Which gender do you identify most with?

- Male
- Female
- I would prefer to not comment

2.AGE: What is your age?

- Under 18
- 18-24 years old
- 25-34 years old
- 35-44 years old
- 45-54 years old

3.ETHNIC ORIGIN: Please specify your ethnicity.

- White
- Hispanic or Latino
- Black or African American
- Native American or American Indian
- Asian / Pacific Islander
- Other

4.EDUCATION: What is the highest degree or level of school you have completed? *If currently enrolled, highest degree received.*

- Less than a high school diploma
- High school degree or equivalent (e.g. GED)
- Some college, no degree
- Associate degree (e.g. AA, AS)

- Bachelor's degree (e.g. BA, BS)
- Master's degree (e.g. MA, MS, MEd)
- Professional degree (e.g. MD, DDS, DVM)
- Doctorate (e.g. PhD, EdD)

Depression, Anxiety and Stress Scale (DASS21)

For each statement below, please circle the number in the column that best represents how you have been feeling in the last week.

(1=Did not apply to me; 4=Applied to me very much or most of the time)

1. I found it hard to wind down

0 1 2 3

2. I was aware of dryness of my mouth

0 1 2 3

3. I couldn't seem to experience any positive feeling at all

0 1 2 3

4. I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)

0 1 2 3

5. I found it difficult to work up the initiative to do things

0 1 2 3

6. I tended to over-react to situations

0 1 2 3

7. I experienced trembling (eg, in the hands)

0 1 2 3

8. I felt that I was using a lot of nervous energy

0 1 2 3

9. I was worried about situations in which I might panic and make a fool of myself

0 1 2 3

10. I felt that I had nothing to look forward to

0 1 2 3

11. I found myself getting agitated

0 1 2 3

11. I found it difficult to relax

0 1 2 3

12. I felt down-hearted and blue

0 1 2 3

14. I was intolerant of anything that kept me from getting on with what I was doing

0 1 2 3

13. I felt I was close to panic

0 1 2 3

14. I was unable to become enthusiastic about anything.

0 1 2 3

17. I felt I wasn't worth much as a person

0 1 2 3

15. I felt that I was rather touchy

0 1 2 3

16. I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)

0 1 2 3

20. I felt scared without any good reason.

0 1 2 3

17. I felt that life was meaningless

0 1 2 3

Emotion Regulation Questionnaire (ERQ)

We would like to ask you some questions about your emotional life, in particular, how you control (that is, regulate and manage) your emotions. The questions below involve two distinct aspects of your emotional life. One is your emotional experience, or what you feel like inside. The other is your emotional expression, or how you show your emotions in the way you talk, gesture, or behave. Although some of the following questions may seem similar to one another, they differ in important ways. For each item, please answer using the following scale: When I want to feel more positive emotion (such as joy or amusement), I change what I'm thinking about.

(1=strongly disagree; 7=strongly agree)

1. I keep my emotions to myself.

1 2 3 4 5 6 7

2. I want to feel less negative emotion (such as sadness or anger), I change what I'm thinking about.

1 2 3 4 5 6 7

3. When I am feeling positive emotions, I am careful not to express them.

1 2 3 4 5 6 7

4. When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm.

1 2 3 4 5 6 7

5. I control my emotions by not expressing them.

1 2 3 4 5 6 7

6. When I want to feel more positive emotion, I change the way I'm thinking about the situation.

1 2 3 4 5 6 7

7. I control my emotions by changing the way I think about the situation I'm in.

1 2 3 4 5 6 7

8. When I am feeling negative emotions, I make sure not to express them.

1 2 3 4 5 6 7

9. When I want to feel less negative emotion, I change the way I'm thinking about the situation.

1 2 3 4 5 6 7

Difficulties in Emotion Regulation Scale (DERS)

Please indicate how often the following statements apply to you by choosing the appropriate number from the scale below on the line beside each item.

(1= Almost never (0-10%);5= Almost always (91-100%))

- 1) I am clear about my feelings.

1 2 3 4 5

2) I pay attention to how I feel.

1 2 3 4 5

3) I experience my emotions as overwhelming and out of control.

1 2 3 4 5

4) I have no idea how I am feeling.

1 2 3 4 5

5) I have difficulty making sense out of my feelings.

1 2 3 4 5

6) I am attentive to my feelings.

1 2 3 4 5

7) I know exactly how I am feeling.

1 2 3 4 5

8) I care about what I am feeling.

1 2 3 4 5

9) I am confused about how I feel.

1 2 3 4 5

10) When I'm upset, I acknowledge my emotions.

1 2 3 4 5

11) When I'm upset, I become angry with myself for feeling that way.

1 2 3 4 5

12) When I'm upset, I become embarrassed for feeling that way.

1 2 3 4 5

13) When I'm upset, I have difficulty getting work done.

1 2 3 4 5

14) When I'm upset, I become out of control.

1 2 3 4 5

15) When I'm upset, I believe that I will remain that way for a long time.

1 2 3 4 5

16) When I'm upset, I believe that I will end up feeling very depressed.

1 2 3 4 5

17) When I'm upset, I believe that my feelings are valid and important.

1 2 3 4 5

18) When I'm upset, I have difficulty focusing on other things.

1 2 3 4 5

19) When I'm upset, I feel out of control.

1 2 3 4 5

20) When I'm upset, I can still get things done.

1 2 3 4 5

21) When I'm upset, I feel ashamed at myself for feeling that way.

1 2 3 4 5

22) When I'm upset, I know that I can find a way to eventually feel better.

1 2 3 4 5

23) When I'm upset, I feel like I am weak.

1 2 3 4 5

24) When I'm upset, I feel like I can remain in control of my behaviors.

1 2 3 4 5

25) When I'm upset, I feel guilty for feeling that way.

1 2 3 4 5

26) When I'm upset, I have difficulty concentrating.

1 2 3 4 5

27) When I'm upset, I have difficulty controlling my behaviors.

1 2 3 4 5

28) When I'm upset, I believe there is nothing I can do to make myself feel better.

1 2 3 4 5

29) When I'm upset, I become irritated at myself for feeling that way.

1 2 3 4 5

30) When I'm upset, I start to feel very bad about myself.

1 2 3 4 5

31) When I'm upset, I believe that wallowing in it is all I can do.

1 2 3 4 5

32) When I'm upset, I lose control over my behavior.

1 2 3 4 5

33) When I'm upset, I have difficulty thinking about anything else.

1 2 3 4 5

34) When I'm upset I take time to figure out what I'm really feeling.

1 2 3 4 5

35) When I'm upset, it takes me a long time to feel better.

1 2 3 4 5

36) When I'm upset, my emotions feel overwhelming

1 2 3 4 5

Emotion Reactivity Scale: Emotional Intensity Subscale

(0 =not at all like me and 4 =completely like me)

1. When I experience emotions, I feel them very strongly/intensely

0 1 2 3 4

2. When something happens that upsets me, it's all I can think about it for a long time.

0 1 2 3 4

3. I experience emotions very strongly.

0 1 2 3 4

4. My moods are very strong and powerful.

0 1 2 3 4

5. My emotions go from neutral to extreme in an instant.

0 1 2 3 4

6. When I feel emotional, it's hard for me to imagine feeling any other way.

0 1 2 3 4

7. I often get so upset it's hard for me to think straight.

0 1 2 3 4

8. My feelings get hurt easily.

0 1 2 3 4

9. When I'm emotionally upset, my whole body gets physically upset as well.

0 1 2 3 4

10. When I am angry/upset, it takes me much longer than most people to calm down.

0 1 2 3 4

Beliefs about Emotion Controllability scale

(0 = Strongly disagree 4 = Strongly disagree)

I can learn to control my emotions

1 2 3 4 5

No matter how hard I try, I can't really change the emotions that I have

1 2 3 4 5

If I want to, I can change the emotions that I have

1 2 3 4 5

The truth is, I have very little control over my emotions

1 2 3 4 5

Everyone can learn to control their emotions

1 2 3 4 5

No matter how hard they try, people can't really change the emotions that they have

1 2 3 4 5

If they want to, people can change the emotions that they have

1 2 3 4 5

The truth is, people have very little control over their emotions

1 2 3 4 5

UPPS negative urgency subscale

(1: Strongly Agree; 2: Strongly Disagree)

1) I have trouble controlling my impulses.

1 2 3 4

2) I have trouble resisting my cravings (for food, cigarettes, etc.).

1 2 3 4

3) I often get involved in things I later wish I could get out of.

1 2 3 4

4) When I feel bad, I will often do things I later regret in order to make myself feel better now.

1 2 3 4

5) Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse.

1 2 3 4

6) When I am upset, I often act without thinking.

1 2 3 4

7) When I feel rejected, I will often say things that I later regret.

1 2 3 4

8) It is hard for me to resist acting on my feelings.

1 2 3 4

9) I often make matters worse because I act without thinking when I am upset.

1 2 3 4

10) In the heat of an argument, I will often say things that I later regret.

1 2 3 4

11) I always keep my feelings under control.

1 2 3 4

12) Sometimes I do impulsive things that I later regret.

1 2 3 4

Eating Disorder Examination Questionnaire

Instructions: The following questions are concerned with the past four weeks (28 days) only. Please read each question carefully. Please answer all of the questions. Please only choose one answer for each question. Thank you.

Questions 1 to 12: Please circle the appropriate number on the right. Please remember that the questions only refer to the past four weeks (28 days) only.

(0=No days; 1=1-5 days; 2=6-12 days; 3=13-15 days; 4=16-22 days; 5=23-27 days; 6=Every day)

1. Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight (whether

or not you have succeeded)?

1 2 3 4 5 6

2. Have you gone for long periods of time (8 waking hours or more) without eating anything at all in order to influence your shape or weight?

1 2 3 4 5 6

3. Have you tried to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)?

1 2 3 4 5 6

4. Have you tried to follow definite rules regarding your eating (for example, a calorie limit) in order to influence your shape or weight (whether or not you have succeeded)?

1 2 3 4 5 6

5. Have you had a definite desire to have an empty stomach with the aim of influencing your shape or weight?

1 2 3 4 5 6

6. Have you had a definite desire to have a totally flat stomach?

1 2 3 4 5 6

7. Has thinking about food, eating or calories made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?

1 2 3 4 5 6

8. Has thinking about shape or weight made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?

1 2 3 4 5 6

9. Have you had a definite fear of losing control over eating?

0 1 2 3 4 5 6

10. Have you had a definite fear that you might gain weight?

1 2 3 4 5 6

11. Have you felt fat?

1 2 3 4 5 6

12. Have you had a strong desire to lose weight?

0 1 2 3 4 5 6

Questions 13-18: Please fill in the appropriate number in the boxes on the right. Remember that the questions only refer to the past four weeks (28 days).

13. Over the past 28 days, how many times have you eaten what other people would regard as an unusually large amount of food (given the circumstances)?

14. On how many of these times did you have a sense of having lost control over your eating (at the time that you were eating)?

15. Over the past 28 days, on how many DAYS have such episodes of overeating occurred (i.e. you have eaten an unusually large amount of food and have had a sense of loss of control at the time)?

16. Over the past 28 days, how many times have you made yourself sick (vomit) as a means of controlling your shape or weight?

17. Over the past 28 days, how many times have you taken laxatives as a means of controlling your shape or weight?

18. Over the past 28 days, how many times have you exercised in a “driven” or “compulsive” way as a means of controlling your weight, shape or amount of fat or to burn off calories?

Questions 19-21: Please circle the appropriate number. Please note that for these questions the term “binge eating” means eating what others would regard as an unusually large amount of food for the circumstances, accompanied by a sense of having lost control over eating.

19. Over the past 28 days, on how many days have you eaten in secret (ie, furtively)?.....Do not count episodes of binge eating

No days 1-5 days 6-12 days 13-15 days 16-22 days 23-27 days Everyday

0 1 2 3 4 5 6

20. On what proportion of the times that you have eaten have you felt guilty (felt that you've done wrong) because of its effect on your shape or weight?Do not count episodes of binge eating

None of A few of Less than half of more than most of every time
the times the times half the times half the time

0 1 2 3 4 5 6

21. Over the past 28 days, how concerned have you been about other people seeing you eat?
.....Do not count episodes of binge eating

Not at all Slightly Moderately Markedly

0 1 2 3 4 5 6

Questions 22-28: Please circle the appropriate number on the right. Remember that the questions only refer to the past four weeks (28 days)

(0=Not at all; 6=Markedly)

22. Has your weight influenced how you think about (judge) yourself as a person?

0 1 2 3 4 5 6

23. Has your shape influenced how you think about (judge) yourself as a person?

0 1 2 3 4 5 6

24. How much would it have upset you if you had been asked to weigh yourself once a week (no more, or less, often) for the next four weeks?

0 1 2 3 4 5 6

25. How dissatisfied have you been with your weight?

0 1 2 3 4 5 6

26. How dissatisfied have you been with your weight?

0 1 2 3 4 5 6

27. How uncomfortable have you felt seeing your body (for example, seeing your shape in the mirror, in a shop window reflection, while undressing or taking a bath or shower)?

0 1 2 3 4 5 6

28. How uncomfortable have you felt about others seeing your shape or figure (for example, in communal changing rooms, when swimming, or wearing tight clothes)?

0 1 2 3 4 5 6

What is your weight at present? (Please give your best estimate).

What is your height? (Please give your best estimate).

If female: Over the past three-to-four months have you missed any menstrual periods?

If so, how many?

