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3 **Compassionate Attention and Regulation of Eating Behaviour (CARE): A pilot**
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5 **study of a brief low intensity intervention for binge eating**
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10 **Short Title:** A pilot study of a brief low intensity intervention for binge eating
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13
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45
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6
7 Science and Technology). The study was funded by Slimming World.
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10 11 12 **Abstract**

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17 A low intensity 4-week intervention that included components of compassion,
18
19 mindfulness and acceptance was delivered to women diagnosed with Binge Eating
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21 Disorder. Participants were randomly assigned to one of two conditions: intervention
22
23 ($n = 11$) or wait-list control ($n = 9$). Participants in the intervention condition were
24
25 invited to practice mindfulness, soothing rhythm breathing and compassionate
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27 imagery practices with a focus on awareness and acceptance of emotional states and
28
29 triggers to binge eat and engagement in helpful actions. Results revealed that, in the
30
31 intervention group, there were significant reductions in eating psychopathology
32
33 symptoms, binge eating symptoms, self-criticism and indicators of psychological
34
35 distress; there were significant increases in compassionate actions and body image-
36
37 related psychological flexibility. Data suggest that developing compassion and
38
39 acceptance competencies may improve eating behaviour and psychological wellbeing
40
41 in individuals with BED.
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48 **Key practitioner message:**

- 49
50 • A low intensity 4-week intervention for BED was tested
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52 • The intervention included components of compassion, mindfulness and
53
54 acceptance
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56 • Results showed efficacy in reduced binge eating and eating psychopathology
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- Participants showed reductions in self-criticism and psychological distress
- Participants increased in self-compassion and body image psychological flexibility

Keywords: Binge eating disorder; intervention; compassion; mindfulness; psychological flexibility

For Peer Review

Introduction

Binge Eating Disorder (BED) is the most common eating disorder, affecting 0.2% to 4.7% of individuals in their lifetime (Kessler et al., 2013). BED is characterized by recurrent (1 or more per week for 3 months) emotionally distressing binge eating episodes. During these episodes, individuals consume amounts of food that are larger than most people would consume under similar circumstances with a sense of lack of control. Individuals may eat faster than usual, in the absence of hunger, in secrecy due to embarrassment, or feel very guilty, ashamed or disgusted with themselves because of this behaviour. BED and binge eating symptomology is currently recognized as a public health problem given its comorbidity with psychological (e.g., depressive and anxiety symptomatology; Hilbert et al., 2011; Kessler et al., 2013) and physical problems, most notably obesity (de Zwaan, 2001; Hudson, Hiripi, Pope, & Kessler, 2007; Kessler et al., 2013). Nonetheless, BED can also occur in normal weight individuals and have significant impact on psychological distress, regardless of actual weight status (Didie & Fitzgibbon, 2005; Duarte, Pinto-Gouveia, & Ferreira, 2015; Kessler et al., 2013).

Some conceptual models view binge eating as resulting from ineffective emotion regulation processes, in which food overconsumption operates as a means to momentarily escape or avoid distressing and unwanted thoughts and emotions (Goldfield, Adamo, Rutherford, & Legg, 2008; Heatherton & Baumeister, 1991; Leehr et al., 2015). There is growing evidence that body image-related perceptions of inferiority, shame, body image shame and self-criticism may underlie and fuel binge eating symptomatology (Duarte, Pinto-Gouveia, & Ferreira, 2014; Dunkley & Grilo, 2007; Hayaki, Friedman, & Brownell, 2002; Jambekar, Masheb, & Grilo, 2003). A

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2
3 tendency to develop inflexible negative self-evaluative cognitions and emotions
4 related to body image, and an excessive focus and concern over eating, may also
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7 account for the severity of binge eating symptoms in the general population (Duarte &
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10 Pinto-Gouveia, 2016) and in patients diagnosed with BED (Duarte, Pinto-Gouveia, &
11
12 Ferreira, 2017). Patients with BED may engage in overeating episodes as a reaction to
13
14 the aversive experience of extreme negative shame-based self-evaluation (Duarte et
15
16 al., 2014, 2017). An important factor associated with binge eating symptoms' severity
17
18 is also body image inflexibility (Sandoz, Wilson, Merwin, & Kellum, 2013), that is,
19
20 the unwillingness to experience unwanted thoughts, emotions, memories and
21
22 sensations related to body image, along with efforts to modify their frequency and
23
24 intensity. A related process that was found to be associated with binge eating
25
26 symptoms is the tendency to become fused with unwanted cravings and impulses to
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28 eat (Duarte, Pinto-Gouveia, Ferreira, & Silva, 2016). These internal events may come
29
30 to dominate one's behaviours, being regarded as events that uneventably will be acted
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32 upon. Binging could therefore be a form of experiential avoidance, that is, a
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34 momentary attempt to control, avoid or find relief from these internal experiences,
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36 that overrides and disregards internal satiety and hunger cues that could exert some
37
38 control over eating behaviour (Baer, Fischer, & Huss, 2005; Kristeller & Wolever,
39
40 2010; Mathieu, 2009). Paradoxically, if binging is a means to find momentary
41
42 comfort or escape from one's own negative self evaluations, the consequence of
43
44 binging is often to increase the intensity and frequency of negative affectivity, shame
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46 and self-criticism (Goss & Gilbert, 2002; Sandoz, Wilson, & DuFrene, 2010). Binge
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48 eating may therefore be maintained through a cycle that has detrimental consequences
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50 for the psychological health of the individual.
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3 Cognitive-Behavioural Therapy is the recommended treatment for BED
4 (Brownley, Berkman, Sedway, Lohr, & Bulik, 2007; Grilo, Masheb, Wilson,
5 Gueorguieva, & White, 2011; Health, 2004; Yager et al., 2014). However, treatment
6 efficacy is limited (Brownley et al., 2016; Vocks et al., 2010). Over the years, new
7 intervention approaches derived from the third wave of cognitive-behavioural
8 therapies (Baer et al., 2005) have been developed and applied to BED, including
9 mindfulness (Kristeller & Wolever, 2010; Kristeller, Baer, & Quillian-Wolever,
10 2006), compassion (e.g. Compassion-Focused Therapy; Gilbert, 2005, 2010; Goss &
11 Allan, 2010) and Acceptance and Commitment Therapy-based interventions (e.g.,
12 Hill, Masuda, Melcher, Morgan, & Twohig 2014; Juarascio, Manasse, Schumacher,
13 Espel, & Forman, 2016). Mindfulness-based interventions have been effective in
14 improving awareness of internal hunger/satiety sensations and reducing binge eating
15 symptoms (Kristeller & Hallett, 1999; Kristeller, Wolever, & Sheets, 2014). CFT was
16 developed to help individuals with high shame and self-criticism (Gilbert, 2010;
17 Gilbert & Choden, 2013; Gilbert & Procter, 2006) develop the competencies to
18 manage negative self-evaluation, self-criticism, and associated defensive behavioural
19 responses (e.g., avoidance; Gilbert, 2005; Gilbert, 2010; Baumeister, Bratslavsky,
20 Finkenauer, & Vohs, 2001; Gilbert, Clarke, Hempel, Miles, & Irons, 2004)). The CFT
21 model aims to increase individuals' capacity for self-compassion by being sensitive to
22 self-suffering and engaging in adaptive/helpful actions to alleviate and prevent that
23 suffering (Gilbert, 2010; Gilbert & Choden, 2013). CFT-E has shown some
24 effectiveness at reducing eating psychopathology in a mixed sample of patients with
25 eating disorders (Gale, Gilbert, Read, & Goss, 2014) and in patients with BED (Kelly
26 & Carter, 2015). Self-compassion scores have been found to be significantly
27 associated with decreased eating disorder symptoms in clinical and nonclinical
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3 samples (Braun, Park & Gorin, 2016; Ferreira, Matos, Duarte, & Pinto-Gouveia,
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5 2014; Ferreira, Pinto-Gouveia, & Duarte, 2013; Wasylikiw, MacKinnon, &
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7 MacLellan, 2012). Kelly, Vimalakanthan and Miller (2014) found that self-
8
9 compassion significantly buffered the impact of Body Mass Index (BMI) on body
10
11 image flexibility (Hayes, 2004; Hayes, Strosahl, & Wilson, 1999; Sandoz et al.,
12
13 2013). ACT interventions focus on the development of psychological flexibility, i.e.
14
15 the ability to flexibly and mindfully note and be willing to accept negative or
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17 disturbing internal experiences (e.g., shame-focused cognitions, body image-related
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19 evaluations, urges to eat), without reacting to them, and while remaining committed to
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21 act in ways that bring the individual closer to what he/she truly values in life (Hayes,
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23 Luoma, Bond, Masuda, & Lillis, 2006; Hayes, Strosahl, & Wilson, 2011; Sandoz et
24
25 al., 2010). The ACT literature advocates that compassion is an integral component in
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27 therapy for the development of psychological flexibility (Dahl, Plumb, Stewart, &
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29 Lundgren, 2009; Luoma & Platt, 2015; Neff & Tirsch, 2013; Tirsch, Schoendorff, &
30
31 Silberstein, 2014). A recent study revealed that a 12-week psychological group
32
33 programme for overweight/obese patients with BED that integrates psychoeducation
34
35 and mindfulness, compassion and acceptance-based components (BEfree; Pinto-
36
37 Gouveia et al., 2016), reduced binge eating symptomatology, shame and depressive
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39 symptoms, and increased mindfulness, self-compassion and psychological flexibility
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41 over a 6 month follow-up period.
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47 “Light touch” interventions may improve treatment availability access, and
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49 engagement compared to more intensive, resource intensive face-to-face approaches.
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51 Evidence shows that brief-self-help interventions are effective in reducing
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53 symptomatology in patients with BED (Carter & Fairburn, 1998; Kelly & Carter,
54
55 2015). The current study aimed at testing the effectiveness of a mindfulness and
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3 compassion-based brief (4-week) self-help intervention (CARE – Compassionate
4 Attention and Regulation of Eating Behaviour) in women from the general population
5 with BED. We hypothesized that the intervention would: i) reduce binge eating
6 symptomatology and related eating disorder pathology, depressive symptoms, shame
7 and self-criticism and ii) improve self-compassion, mindfulness skills and
8 psychological flexibility.
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18 **Method**

20 **Participants**

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25 Participants were 20 women from the community with a diagnosis of BED.
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27 Participants in the intervention condition (IC, $n = 11$) had a mean (SD) age of 37.73
28 (7.50), BMI of 31.89 (6.25); 15.36 (2.34) years of education; 72.7% were married and
29 most of them had medium socio-economic status. Participants in the wait-list control
30 group (WLC; $n = 9$) had a mean age of 35.78 (9.08), BMI of 31.89 (6.25), 16.75
31 (2.49) years of education; 66.7% of the participants were single and had medium to
32 high socio-economic status (66.6%). All participants were Caucasian. The two groups
33 did not present statistically significant differences regarding age ($Z = -.88$; $p = .380$),
34 years of education ($Z = -1.07$; $p = .283$), marital status ($\chi^2 = 5.46$; $p = .065$),
35 socioeconomic status ($Z = 5.50$; $p = .240$) and BMI ($Z = -.46$; $p = .648$).
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50 **Procedure**

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52 This pilot study is part of a wider research investigating the effect of
53 psychological processes in the maintenance and treatment of binge eating. The study
54 was approved by the Ethics Commission of the Faculty of Psychology and
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3 Educational Sciences of the University of Coimbra. Participants were recruited
4 through flyers and advertisements in the University of Coimbra website and in
5 national newspapers. Participants met DSM-5 (American Psychiatric Association,
6 2013) diagnosis criteria for BED, as established through the Eating Disorder
7 Examination (17.0D; Fairburn, Cooper, & O'Connor, 2008) and met the following
8 inclusion criteria: > 18 years old; able to access the internet; available to attend the
9 assessment sessions. The exclusion criteria were: i) receiving current psychological
10 treatment for BED; ii) current comorbid severe mental disorders (e.g., bipolar
11 disorder, severe major depression, schizophrenia, substance abuse) as established by a
12 screening interview based on DSM-5 criteria (American Psychiatric Association,
13 2013); iii) pregnant; iv) medical or endocrine disorders affecting appetite control; v)
14 illiteracy or significant cognitive impairment. The procedure and aims of the study
15 were explained to the potential participants, and those who agreed to take part in the
16 study provided their written informed consent. Figure 1 details the recruitment
17 process of the study. Participants were randomly assigned to either the IC or the WLC
18 conditions. Participants were assessed at baseline and at post-treatment. At 1-month
19 follow-up participants filled the self-report measures through an online questionnaire.
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Insert Figure 1 approximately here

43 44 45 46 47 **Measures**

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52 *BMI.* Participants' BMI was assessed through the formula kilograms divided by
53 height in meters squared. Weight was estimated using a Body Mass Analyzer
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3 (TANITA-SC-330) accurate to 0.1kg. Participants were weighed dressed and without
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5 shoes.
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10 *Eating Disorder Examination 17.0D* (Fairburn et al., 2008). EDE is a semi-structured
11 clinical interview that assesses the frequency and intensity of key behavioural and
12 psychological features of eating disorders. The EDE comprises four subscales:
13 restraint, eating concern, shape concern and weight concern. It can also provide a
14 measure of overvaluation of weight and shape. The mean of the four subscales
15 provides a global score of overall eating psychopathological severity. EDE has good
16 psychometric properties (Fairburn, 2008). In the present study, EDE presented an
17 internal consistency of $\alpha = .93$. For the follow-up measurement the self-report version
18 of this interview was used (Fairburn & Beglin, 1994; Machado et al., 2014).
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32 *Binge eating Scale* (BES; Gormally, Black, Daston, & Rardin, 1982). BES is a 16-
33 item self-report questionnaire that measures the severity of binge eating
34 symptomatology, including the emotional, cognitive and behavioural dimensions of
35 binge eating. Each item includes three to four statements and participants are asked to
36 choose which of the statements best describes their experience. Each statement
37 represents a rating of severity ranging from 0 (no difficulties with binge eating) to 3
38 (severe difficulties with binge eating). Both the original (Gormally et al., 1982) and
39 Portuguese (Duarte, Pinto-Gouveia, et al., 2015) versions show good internal
40 consistency. In the current study BES also presented high internal consistency ($\alpha =$
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3 *Body Image Shame Scale* (BISS; Duarte, Pinto-Gouveia, Ferreira, & Batista, 2015).
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5 The BISS is a 14-item scale that assesses body image shame, i.e. negative self-
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7 evaluations and evaluations that others negatively evaluate the subject's physical
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9 appearance. Participants are asked to rate each item according to the frequency they
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11 experience body image shame, using a 5-point scale (ranging from 0 = *Never* to 4 =
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13 *Almost always*). The scale revealed high internal consistency in the original (Duarte,
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15 Pinto-Gouveia, Ferreira, et al., 2015) and in the current study ($\alpha = .88$).
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21 *Depression, Anxiety and Stress Scale* (DASS21; (Lovibond & Lovibond, 1995). The
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23 21-item DASS21 comprises three subscales measuring depression, anxiety and stress
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25 symptoms. Participants are asked to rate how much each statement applied to them
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27 over the past week, on a 4-point scale (0 = *Did not apply to me at all*, 3 = *Applied to*
28
29 *me very much, or most of the time*). The DASS21 has good psychometric properties
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31 in both the original (Lovibond & Lovibond, 1995) and Portuguese versions (Pais-
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33 Ribeiro, Honrado, & Leal, 2004). In the current study the subscales depression,
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35 anxiety and stress presented Cronbach's alpha values of .84 .91 and .84, respectively.
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41 *Cognitive Fusion Questionnaire – Food Craving* (CFQ-FC; Duarte, Pinto-Gouveia,
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43 Ferreira, & Silva, 2016). The CFQ-FC is a 7-item self-report measure that assesses
44
45 the degree to which individuals are fused with disturbing and undesirable thoughts
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47 and cravings about food. Participants are asked to evaluate the extent in which each
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49 statement is true to them, using a 7-point scale (ranging from 1= *Never true* to 7 =
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51 *Always true*). The original version of the scale was found to have good psychometric
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53 properties (Duarte et al., 2016). The scale presented a Cronbach's alpha of .86 in this
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55 study.
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Body Image Acceptance and Action Questionnaire (BIAAQ; Sandoz et al., 2013) is a 12-item self-report questionnaire that assesses the ability to openly accept body image-related internal experiences without attempts to avoid or alter them. Items are rated in a 7-point scale (1 = *Never true* to 7 = *Always true*). Both the original (Sandoz et al., 2013) and the Portuguese version (Ferreira, Pinto-Gouveia, & Duarte, 2011) show good psychometric properties. In the current study BIAAQ presented an internal consistency of $\alpha = .84$.

Five Facet Mindfulness Questionnaire (FFMQ; Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). FFMQ is a 37-item self-report questionnaire that assesses the distinct facets of trait mindfulness, including the subscales: observe; describe; act with awareness; nonjudgement; and non-reacting. Participants are asked to rate how mindful they feel in their daily life using a 5-point scale (1 = *Never or very rarely true* to 5 = *Often or always true*). The scale shows good psychometric properties both in the original (Baer et al., 2006) and in the Portuguese version (Gregório & Pinto-Gouveia, 2011). In the current study, the subscales presented the following internal consistencies: observe ($\alpha = .84$), describe ($\alpha = .89$), act with awareness ($\alpha = .86$), nonjudgement ($\alpha = .91$) and non-reacting ($\alpha = .77$).

Compassion Attributes and Actions Scales (CAAS; Gilbert et al., 2016). The CAAS measures compassion according to traditional definitions of compassion, focusing on the motivation to attend to one's and others' suffering and alleviate or prevent it (Dalai Lama, 1995; Gilbert & Choden, 2013). This scale focuses on the three orientations of compassion: compassion to self, compassion to others, and the

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2
3 capacity to be open and aware of the compassion from others. In each scale two
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5 subscales assessing the two core components of compassion are measured: Attributes,
6
7 referring to the sensitivity to the suffering of self and others; Actions, involving the
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9 commitment to try to alleviate and prevent suffering (Gilbert & Choden, 2013). In the
10
11 current study we used the scale compassion for self, which revealed a Cronbach's
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13 alpha of .61 for the Attributes subscale and a Cronbach's alpha of .95 in the Actions
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15 subscales.
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21 *Self-Compassion Scale* (SCS; Neff, 2003). SCS is a 26-item scale that assesses core
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23 elements of a healthy and compassionate attitude to oneself: self-kindness (vs. self-
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25 judgement), common humanity (vs. isolation) and mindfulness (vs. over-
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27 identification). Participants indicated how often they engaged in these ways of self-
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29 relating using a 5-point scale (1 = *Almost never* to 5 = *Almost always*). The SCS has
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31 good internal consistency (Castilho, & Pinto-Gouveia, J. , 2011; Neff, 2003). The
32
33 internal consistency in the current study was .93.
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39 *Forms of Self-Criticism and Self-Reassurance Scale* (FSCRS; Castilho, Pinto-
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41 Gouveia, & Duarte, 2015; Gilbert et al., 2004). This 22-item scale measures people's
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43 critical and self-reassuring responses to setbacks or disappointments. Participants rate
44
45 on a 5-point scale (0 = *Not at all like me* to 4 = *Extremely like me*) how they usually
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47 think and react in those situations. The scale measures two forms of self-criticism:
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49 inadequate self, which focuses on a sense of personal inadequacy and hated self,
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51 which measures the desire to hurt or persecute the self. The scale also measures self-
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53 reassurance when things go wrong. The scale has good psychometric properties in the
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55 original (Gilbert et al., 2004) and Portuguese version (Castilho, Pinto-Gouveia, &
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3 Duarte, 2015). In the current study the subscales presented the following internal
4 consistency values: inadequate self ($\alpha = .90$), hated self ($\alpha = .72$), self-reassurance (α
5 = .87).
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10 11 *Feedback data*

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14 Participants were asked to report how frequently did they practice the exercises, their
15 perceived utility and importance and to provide general feedback on the practices and
16 on the programme as a whole.
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20 21 22 **Overview of the CARE intervention**

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24
25 Participants assigned to the IC condition were invited to attend a 2 1/2 hour
26 group session. In this session the researchers gave a psychoeducation presentation
27 (PowerPoint) on the factors underlying difficulties in regulating eating, on emotion
28 regulation systems and on the binge eating cycle. This presentation also focused on
29 the concepts of mindfulness and compassion and how they may help individuals
30 manage impulses to binge eat in the face of negative affectivity, shame or self-critical
31 thoughts. The potential role of compassion in supporting and motivating engagement
32 in helpful actions that are committed with one's wellbeing and life pursuits were
33 described. Participants were shown mindfulness meditation and the compassionate
34 imagery exercises and had the opportunity to practice and ask any questions about the
35 programme. At the end of the session, participants were given a programme support
36 manual with instructions on how to follow the exercises during the next 4 weeks and
37 were given personal access keys to the webpage where they could find the audio
38 exercises.
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3 The instructions guided participants to practice mindfulness during week 1 of
4 the 4 week intervention. The practices aimed at increasing participants' present
5 moment awareness, sensitivity to internal cues of hunger and satiety, eating awareness
6 and reducing reactivity and impulsive eating. These practices were adapted from
7 Kabat-Zinn's (1990) programme and from the BEfree intervention manual (Pinto-
8 Gouveia et al., 2016) and included: i) *Mindfulness of the breath*; ii) *Body scan*; iii)
9 *Mindful eating*. During this first week participants were also asked to practice
10 *Soothing Rhythm Breathing*, a practice included in Compassion Focused Therapy
11 (Gilbert, 2000, 2010, Gilbert & Choden, 2013) that aims to lower arousal and induce
12 calmness through the activation of the vagal parasympathetic nervous system (Porges,
13 2007; Gilbert, 2010). At the end of week 1 participants were directed to a link to an
14 online questionnaire where they were asked to give feedback on the practices.
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30 During weeks 2-4 participants were invited to practice compassionate imagery
31 (Gilbert & Choden, 2013). These practices focused on (i) helping participants develop
32 their ability to experience and generate compassionate feelings when experiencing
33 body image and eating-related problems, (ii) improving a caring intention and
34 commitment to alleviate one's suffering and support helpful actions. The
35 compassionate imagery practices were adapted from Gilbert and Choden (2013)
36 compassion and mindfulness manual and from Goss (2011) self-help manual for
37 overeating, and included: i) *Building the Compassionate self*; ii) *Cultivating*
38 *compassion for others*; iii) *Cultivating compassion for someone with eating*
39 *difficulties*; iv) *Cultivating compassion for the self*.
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52 Throughout the 4 week intervention participants were encouraged to adopt
53 daily informal practices (i) to bring awareness to the present moment, especially when
54 eating, (ii) keep an aware and compassionate perspective during their daily life, (iii)
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3 accept negative emotional experiences without engaging in reactive behaviours (iv) to
4 be kind and supportive of themselves in adopting compassionate helpful actions in
5 those moments. Participants were encouraged to commit to cultivating this
6 compassionate mindset and to choose the most effective actions that may help them
7 build a life they find more meaningful.
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14 At the end of the four week intervention participants were invited to attend an
15 assessment session where they provided self-reported feedback on the compassionate
16 imagery practices, on the programme as a whole, and completed post-intervention
17 measurements. Participants completed an online questionnaire with follow up self-
18 report measures 1 month after the end of the programme. After the IC completed the
19 programme and the post-intervention assessment, participants on the WLC group
20 were invited to participate in the programme.
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32 **Analytic Plan**

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36 The baseline differences between the IC and WLC groups were compared
37 using non-parametric Mann-Whitney U tests were conducted for the continuous
38 variables and chi-square tests for categorical variables.
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43 A series of 2 (condition) x 2 (time) Repeated Measures Analysis of Variance
44 (ANOVA) were conducted to examine differences between pre- and post-intervention
45 between the IC and the WLC groups. Significant time-group interactions were
46 interpreted as effects of the intervention compared to control. Within-group
47 differences were examined using Non-parametric Wilcoxon Signed Rank tests.
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54 A Repeated Measures ANOVA was conducted in all participants who
55 completed the intervention and the 1-month follow up assessment, to examine
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3 evidence of sustainability one month later. Descriptive statistics were calculated for
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5 the post-intervention feedback data.
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8 G*Power a-priori power calculation for within-group repeated measures
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10 analysis, assuming a p value of 0.05, an effect size of $f = 0.4$, with a statistical power
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12 of 0.80, indicated that the recommended minimum sample size was 16. Effect sizes
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14 were calculated through partial eta squares (η^2): .20 indicate a small effect size, .50 a
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16 medium effect and .80 a large effect size (Tabachnick & Fidell, 2013). The effect
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18 sizes for the Wilcoxon Signed Rank were calculated by dividing the z value by the
19
20 square root of N , with .1 indicating a small effect, .3 a medium effect and .5 a large
21
22 effect (Cohen, 1988). All statistical analyses were computed using SPSS version 20
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24 (IBM, Armonk, NY).
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29 30 **Results**

31 32 33 **Baseline differences**

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36 There were no significant differences in the self-report measures between the
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38 intervention and control group (all $p > .050$).
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43 44 **Changes from pre-intervention to post intervention**

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46 Results of the 2x2 Repeated Measures ANOVA and associated Wilcoxon
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48 Signed Rank tests are presented in Table 1. The intervention significantly reduced
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50 binge eating symptoms, eating psychopathology indicators, overvaluation of weight
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52 and shape, cognitive fusion with food craving, inadequate self subscale for self-
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54 criticism, depressive and stress symptoms. The intervention significantly improved
55
56 psychological flexibility regarding body image and the nonjudging facet of
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3 mindfulness. There was a marginal effect on self-compassion ($p = .054$) and a
4
5 significant effect on improving the ability to engage in compassionate actions. Effects
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7 sizes were small to medium. Wilcoxon Signed Rank tests also indicated that,
8
9 comparing to participants in the WLC, participants in the IC condition presented a
10
11 significant reduction in body image shame, the hated-self form of self criticism, and
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13 increases in acting with awareness and self-reassurance.
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Insert Table 1 about here

Follow up analyses

Results of the 1-month follow-up analyses are reported in Table 2. At 1-
months after the intervention effects were maintained for binge eating, general eating
psychopathology, overvaluation of weight and shape, depression and stress
symptoms, cognitive fusion with food craving, body image psychological flexibility,
self-compassion and compassionate actions.

Insert Table 2 about here

Intervention feedback data

Feedback data obtained indicated a high practice frequency, namely on the
first three weeks of the programme (see Table 3). After the first week, 75% of
participants reported that they noticed an increase in present moment awareness; 50%
noticed an increase in eating awareness. All participants reported that they kept the
practices of the first week during the second week, 87.5% kept them during the third
week and 81.3% kept them during the fourth week. After completing the programme,
87.5% of the participants mentioned being more able to bring their awareness to the

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3 present moment; 93.8% mentioned being more able to eat in a more aware and calmer
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5 way: 93.8% mentioned being more able to act more compassionately or feeling like
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7 their best compassionate self (by providing dichotomous yes-no answers). Most
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9 participants reported that the practices were very useful and that the materials of the
10
11 programme were very important. Sixty-two point five percent of the participants
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13 reported that they experienced 'a lot' of positive changes on their life and on how they
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15 deal with thoughts and emotions.
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21 Discussion

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25 This pilot study examined the effectiveness of a 4-week low intensity
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27 intervention for women from the general community with BED. Results offered
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29 preliminary evidence that this intervention could be effective in reducing the severity
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31 of self-reported binge eating symptomatology, general eating psychopathology,
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33 overvaluation of body weight and shape, symptoms of depression and stress, the
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35 inadequate-self form of self-criticism, and cognitive fusion with food craving. There
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37 was also evidence of improved psychological flexibility regarding body image, non-
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39 judgemental facet of mindfulness and aspects of self-compassion.
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43 The fact that both groups had disclosed difficult body image experiences and
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45 problems with controlling eating behaviour in the assessment session may have
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47 accounted for the lack of significant effects of the intervention on body image shame
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49 and the hated self form of self-criticism. Nonetheless, results of the within group
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51 analysis indicated that these decreases were only significant on the participants in the
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53 IC condition. Participants of the intervention also presented a significant increase in
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55 the mindful ability to act with greater awareness.
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3 The current results indicate that even though the intervention did not have
4 significant effects in improving participants' ability to be sensitive and moved by
5 their own suffering, they significantly increased their commitment to change their
6 course of action to alleviate and prevent it, with potential beneficial effects on their
7 eating behaviour (Gilbert & Choden, 2013). This could indicate a lack of
8 effectiveness of the intervention and be reflective of the participants' responses to the
9 demand characteristics of the study. Another interpretation may be that in people
10 struggling with binge eating and body image difficulties a more intense or prolonged
11 intervention may be required to produce changes in the ability to connect with one's
12 suffering and to be sensitive and tolerant of one's faults or difficulties.
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25 The findings of this study suggested that helping individuals cultivate a
26 compassionate self-awareness and focus could reduce the tendency to become
27 entangled in thoughts about eating and on perceiving urges to eat as requiring an
28 inevitable reaction in their response (Duarte et al., 2016; Gillanders et al., 2014;
29 Hayes et al., 1999; Luoma & Hayes, 2003). There was some evidence that the
30 intervention may have promoted some degree of psychological flexibility around
31 body image. It has been suggested that this entails a capacity to accept ongoing
32 thoughts and emotions related to body image while being flexibly sensitive to
33 contextual cues and persisting in behaviours that are aligned with one's valued goals
34 in life (Hayes et al., 1999; Sandoz et al., 2010; Sandoz et al., 2013). These findings
35 are in line with previous empirical evidence (Kelly et al., 2014; Pinto-Gouveia et al.,
36 2016) and theoretical suggestions (Dahl et al., 2009; Neff & Tirch, 2013; Tirch et al.,
37 2014) that compassion is a fundamental therapeutic ingredient to support acceptance
38 of the present moment experiences, and the choice of acting effectively (instead of
39 reactively) even when experiencing difficult and aversive thoughts and emotions.
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3 The feedback data provided by the participants who completed the programme
4 suggest that most participants revealed high engagement with the proposed practices.
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6 Most participants also found that the programme improved their ability to be more
7 mindful and focused on the present moment when eating, and that it improved their
8 ability to act from a more compassionate perspective, especially when coping with
9 negative thoughts and emotions.
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16 Some of the intervention effects were maintained one month after the
17 intervention.
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20 This pilot study has important limitations. Firstly, it is not possible in the
21 current study design to dissociate the effect of the intervention content from the
22 setting in which it was conducted (e.g., interactions with the investigators who had a
23 vested interest in the outcome). The present analysis did not control for such effects.
24
25 This may have inflated the effect size estimates in the present study and future studies
26 should control for such possible confounders. Secondly this was a very small sample
27 of female participants with low to moderate BED pathology. Although the current
28 sample size allowed for the detection of large effects, a larger sample would be
29 required to identify small to medium effects. Future research should seek to replicate
30 the current findings in larger samples with varying degrees of BED severity. Future
31 studies should also explore gender differences in response to interventions of this
32 nature. Thirdly, longer periods of follow-up are necessary to ascertain whether
33 participants' responses are maintained over time. Fourth the use of the FFMQ may
34 have limited the findings of our study, as there is evidence that this measure may have
35 inconsistent results depending on the meditation experience of the respondents (R.A.
36 Baer et al., 2008). Future studies should consider using specifically designed eating-
37 focused measures of mindfulness. Fifth, the effects of the intervention were assessed
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3 through the comparison of participants randomly assigned to the IC or the WLC
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5 conditions. It would be important to conduct a full randomized control trial comparing
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7 the CARE intervention with other low intensity interventions (e.g., self help-based
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9 CBT or CFT-based interventions; (Kelly & Carter, 2015) using a full process
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11 evaluation framework (e.g. Moore et al., 2015). Future research should investigate
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13 possible mechanisms and contaminants through which the intervention produces
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15 changes in outcomes. Moreover, there was a considerable attrition rate in the
16
17 intervention, which may be explained by some participants' interest and inclination to
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19 adhere to technology-facilitated interventions. It may also be the case that those who
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21 dropped out may have required more support. Future research should assess and
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23 address these issues and implement strategies that facilitate adherence and programme
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25 completion (e.g., tailoring of the intervention, increased therapist support, frequent
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27 prompting via e-mail).
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32 Results of this study offer some preliminary evidence that this brief low
33
34 intensity integrative intervention may be effective in treating BED. Although the full
35
36 effectiveness of the content of this type of intervention is yet to be established, the
37
38 findings need to be understood with caution, this is a cost-effective intervention that
39
40 may improve access to treatment of individuals from the general community who
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42 struggle with binge eating.
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Table 1.

Mean scores, standard deviations and statistics for intervention and control groups at pre and post-intervention

Eating and body image psychopathology						
Measures	Time	Intervention		Time	Time X Group	Significant Wilcoxon Signed Rank tests
		Group <i>n</i> = 11	Control Group <i>n</i> = 9			
		Mean (SD)	Mean (SD)			Intervention Group: T2 > T1
BES	T1	22.81 (7.41)	17.00 (5.77)	$F_{(1,18)} = 70.12, p < .001, \eta^2 p = .80$	$F_{(1,18)} = 42.72, p < .001, \eta^2 p = .70$	$Z = -2.94, p = .003, d = .89$
Binge Eating	T2	12.00 (7.63)	15.66 (4.85)			
EDE	T1	3.40 (0.84)	3.21 (0.81)	$F_{(1,18)} = 65.65, p < .001, \eta^2 p = .79$	$F_{(1,18)} = 60.09, p < .001, \eta^2 p = .78$	Intervention Group: T2 > T1 $Z = -2.94, p = .003, d = .89$
Total	T2	1.46 (0.81)	3.17 (0.57)			
EDE	T1	2.98 (0.82)	2.30 (1.25)	$F_{(1,18)} = 27.50, p < .001, \eta^2 p = .62$	$F_{(1,18)} = 27.50, p < .001, \eta^2 p = .62$	Intervention Group: T2 > T1 $Z = -2.94, p = .003, d = .89$
Restraint	T2	0.92 (0.86)	2.30 (1.16)			
EDE	T1	2.25 (0.99)	1.98 (1.29)	$F_{(1,18)} = 28.51, p < .001, \eta^2 p = .63$	$F_{(1,18)} = 21.58, p < .001, \eta^2 p = .56$	Intervention Group: T2 > T1 $Z = -2.94, p = .003, d = .89$
Eating Concern	T2	0.45 (0.63)	1.85 (0.86)			
EDE	T1	4.39 (1.21)	4.53 (0.60)	$F_{(1,18)} = 45.19, p < .001, \eta^2 p = .73$	$F_{(1,18)} = 41.01, p < .001, \eta^2 p = .71$	Intervention Group: T2 > T1 $Z = -2.94, p = .003, d = .89$
Shape Concern	T2	2.45 (1.10)	4.48 (0.55)			
EDE	T1	3.98 (1.06)	4.05 (0.78)	$F_{(1,18)} = 34.10, p < .001, \eta^2 p = .67$	$F_{(1,18)} = 34.10, p < .001, \eta^2 p = .67$	Intervention Group: T2 > T1 $Z = -2.95, p = .003, d = .89$
Weight Concern	T2	2.00 (1.07)	4.05 (0.68)			
EDE	T1	5.00	5.35	$F_{(1,18)} = 45.33, p$	$F_{(1,18)} = 29.60, p$	Intervention Group:

overvaluation		(1.18)	(0.63)	< .001, $\eta^2 p = .74$	< .001, $\eta^2 p = .65$	T2 > T1 $Z = -2.95, p = .003, d = .89$
	T2	1.63 (1.43)	5.00 (1.04)			
Binge eating episodes	T1	4.73 (1.62)	6.14 (2.04)	$F_{(1,18)} = 16.82, p = .001, \eta^2 p = .51$	$F_{(1,18)} = 5.11, p = .038, \eta^2 p = .24$	Intervention Group: T2 > T1 $Z = -2.97, p = .003, d = .89$
	T2	1.27 (3.04)	5.14 (3.39)			
BMI	T1	31.89 (6.25)	30.67 (7.47)	$F_{(1,18)} = 1.74, p = .204, \eta^2 p = .09$	$F_{(1,18)} = 1.02, p = .326, \eta^2 p = .05$	
	T2	31.85 (6.40)	30.38 (7.44)			
BISS	T1	2.59 (0.71)	2.56 (0.45)	$F_{(1,18)} = 13.66, p = .002, \eta^2 p = .43$	$F_{(1,18)} = 2.03, p = .172, \eta^2 p = .10$	Intervention Group: T2 > T1 $Z = -2.45, p = .014, d = .74$
	T2	2.02 (0.87)	2.30 (0.56)			

General Psychopathology

Measures	Time	Intervention Control		Time	Time X Group	Significant Post-hoc Paired t-test
		Group	Group			
		<i>n</i> = 9				
		<i>n</i> = 11				
		Mean (SD)	Mean (SD)			Intervention Group: T2 > T1
DASS21 Depression	T1	5.64 (4.95)	4.67 (2.00)	$F_{(1,18)} = 11.10, p = .004, \eta^2 p = .38$	$F_{(1,18)} = 5.90, p = .026, \eta^2 p = .25$	$Z = -2.68, p = .007, d = .81$
	T2	2.09 (3.44)	5.64 (4.94)			
DASS21 Anxiety	T1	3.55 (5.41)	2.00 (2.29)	$F_{(1,18)} = 0.94, p = .346, \eta^2 p = .05$	$F_{(1,18)} = 1.27, p = .247, \eta^2 p = .07$	
	T2	2.09 (2.77)	2.11 (2.15)			
DASS21 Stress	T1	9.18 (4.98)	7.22 (2.54)	$F_{(1,18)} = 11.44, p = .003, \eta^2 p = .39$	$F_{(1,18)} = 7.66, p = .013, \eta^2 p = .30$	Intervention Group: T2 > T1 $Z = -2.73, p = .006, d = .82$
	T2	4.73 (2.24)	6.78 (2.73)			

Psychological Flexibility

		Intervention	Control	Time	Time X Group	Significant Post-hoc
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		Intervention Group	Control Group			Paired t-test
		<i>n</i> = 9				
		<i>n</i> = 11				
Measures	Time	Mean (SD)	Mean (SD)			Intervention Group:
CFQFC Cognitive Fusion Food Craving	T1	33.02 (7.10)	30.67 (9.41)	$F_{(1,18)} = 10.54, p = .001, \eta^2 p = .53$	$F_{(1,18)} = 14.29, p = .001, \eta^2 p = .44$	T2 > T1 $Z = -2.94, p = .003, d = .89$
	T2	22.55 (10.27)	29.56 (7.10)			
BIAAQ Body Image Flexibility	T1	41.55 (16.00)	42.33 (13.74)	$F_{(1,18)} = 7.73, p = .012, \eta^2 p = .30$	$F_{(1,18)} = 6.47, p = .020, \eta^2 p = .26$	T2 > T1 $Z = -2.40, p = .016, d = .72$
	T2	54.09 (18.81)	42.89 (11.70)			
Mindfulness						
		Intervention Group	Control Group	Time	Time X Group	Significant Post-hoc Paired t-test
		<i>n</i> = 9				
		<i>n</i> = 11				
Measures	Time	Mean (SD)	Mean (SD)			
FFMQ - Observe	T1	25.09 (5.56)	22.56 (5.58)	$F_{(1,18)} = 0.02, p = .905, \eta^2 p = .00$	$F_{(1,18)} = 0.00, p = .960, \eta^2 p = .000$	
	T2	25.18 (3.57)	22.78 (3.49)			
FFMQ Describe	T1	27.09 (5.73)	26.78 (5.74)	$F_{(1,18)} = 0.91, p = .353, \eta^2 p = .05$	$F_{(1,18)} = 0.42, p = .523, \eta^2 p = .02$	
	T2	27.36 (6.44)	28.22 (5.63)			
FFMQ Act awareness	T1	23.55 (4.99)	23.67 (5.00)	$F_{(1,18)} = 9.52, p = .006, \eta^2 p = .35$	$F_{(1,18)} = 1.02, p = .326, \eta^2 p = .05$	T2 > T1 $Z = -2.00, p = .045, d = .60$
	T2	27.27 (4.63)	25.56 (4.75)			
FFMQ Nonjudging	T1	20.18 (5.34)	24.89 (6.41)	$F_{(1,18)} = 10.77, p = .004, \eta^2 p = .37$	$F_{(1,18)} = 16.64, p = .001, \eta^2 p = .48$	T2 > T1 $Z = -2.68, p = .007, d = .60$
	T2	27.36 (5.26)	24.11 (6.94)			
FFMQ Nonreact	T1	15.90 (4.39)	16.22 (1.86)	$F_{(1,18)} = 3.32, p = .085, \eta^2 p = .16$	$F_{(1,18)} = 1.92, p = .183, \eta^2 p = .10$	

	T2	18.37 (3.85)	16.55 (2.46)			
Self-criticism and self-compassion						
		Intervention Group <i>n</i> = 11	Control Group <i>n</i> = 9	Time	Time X Group	Significant Post-hoc Paired t-test
Measures	Time	Mean (SD)	Mean (SD)			
SCS total	T1	2.83 (0.65)	2.84 (0.50)	$F_{(1,18)} = 9.13, p = .008, \eta^2 p = .36$	$F_{(1,18)} = 4.34, p = .054, \eta^2 p = .21$	Intervention Group: T2 > T1 $Z = -2.37, p = .018, d = .71$
	T2	3.38 (0.72)	2.94 (0.45)			
CAAS Attributes	T1	35.09 (7.35)	33.44 (9.79)	$F_{(1,18)} = 1.86, p = .190, \eta^2 p = .09$	$F_{(1,18)} = 1.62, p = .220, \eta^2 p = .08$	
	T2	41.54 (10.58)	33.67 (7.30)			
CAAS Actions	T1	21.27 (8.22)	20.56 (8.14)	$F_{(1,18)} = 9.10, p = .007, \eta^2 p = .34$	$F_{(1,18)} = 7.83, p = .012, \eta^2 p = .30$	Intervention Group: T2 > T1 $Z = -2.58, p = .010, d = .78$
	T2	30.09 (6.92)	20.89 (6.33)			
FSCRS Reassured self	T1	1.99 (0.71)	1.88 (0.44)	$F_{(1,18)} = 7.49, p = .014, \eta^2 p = .29$	$F_{(1,18)} = 2.17, p = .158, \eta^2 p = .11$	Intervention Group: T2 > T1 $Z = -2.00, p = .045, d = .60$
	T2	2.64 (0.88)	2.07 (0.59)			
FSCRS Hated self	T1	1.15 (0.78)	1.02 (0.55)	$F_{(1,18)} = 7.86, p = .012, \eta^2 p = .30$	$F_{(1,18)} = 1.21, p = .286, \eta^2 p = .06$	Intervention Group: T2 > T1 $Z = -2.28, p = .022, d = .69$
	T2	0.64 (0.84)	0.80 (0.53)			
FSCRS Inadequate self	T1	2.45 (0.82)	2.21 (0.73)	$F_{(1,18)} = 12.61, p = .002, \eta^2 p = .41$	$F_{(1,18)} = 8.38, p = .010, \eta^2 p = .32$	Intervention Group: T2 > T1 $Z = -2.70, p = .007, d = .69$
	T2	1.61 (0.87)	2.12 (0.94)			

Note: BES = Binge Eating Scale; EDE = Eating Disorder Examination 17.0; BMI = Body Mass Index; DASS21 = Depression, Anxiety and Stress Scales; CFQFC = Cognitive Fusion Questionnaire Food Craving; BIAAQ = Body Image Acceptance and Action Questionnaire; BISS = Body Image Shame Scale; SCS = Self-Compassion Scale; CAAS = Compassion Attributes and Actions Scale; FSCRS = Forms of self-criticising and self reassurance scale.

Table 2.

Means (M) and Standard deviations (SD) for the 1-month follow up and ANOVA results for the comparison between post-intervention and the follow up assessment (N = 11)

Variable	Follow up			
	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>
BES Binge Eating	10.45	9.50	0.539	.480
EDE Total	1.76	1.28	2.93	.226
EDE Overvaluation shape and weight	2.18	1.85	4.25	.066
EDE Restraint	1.38	1.18	6.34	.030
EDE Eating Concern	1.02	1.43	5.27	.045
EDE Shape Concern	2.45	1.64	.057	.816
EDE Weight Concern	2.18	1.50	0.51	.493
BISS	2.79	0.86	139.80	< .001
Depression	2.81	3.22	1.24	.291
Anxiety	0.55	9.83	9.83	.011
Stress	4.73	3.10	0.01	.930
CFQFC Cognitive Fusion Food Craving	20.82	8.41	0.29	.603
BIAAQ Body Image Flexibility	56.81	16.12	1.04	.332
FFMQ Observe	20.91	5.17	5.77	.037
FFMQ Describe	21.27	4.76	12.37	.006
FFMQ Act awareness	21.27	6.15	12.15	.006
FFMQ Nonjudging	23.09	5.96	12.18	.006
FFMQ Nonreacting	16.72	5.68	0.663	.445
SCS total	3.41	0.68	0.15	.708
CAAS Attributes	33.82	7.90	4.326	.064
CAAS Actions	25.19	7.61	2.06	.181
FSCRS Reassured self	3.20	0.71	14.61	.003
FSCRS Hated self	1.51	0.38	38.91	<.001
FSCRS Inadequate self	2.42	1.10	20.79	.001

Note: BES = Binge Eating Scale; EDE = Eating Disorder Examination 17.0; BMI = Body Mass Index; DASS21 = Depression, Anxiety and Stress Scales; CFQFC = Cognitive Fusion Questionnaire Food Craving; BIAAQ = Body Image Acceptance and Action Questionnaire;

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3 BISS = Body Image Shame Scale; SCS = Self-Compassion Scale; CAAS = Compassion
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5 Attributes and Actions Scale; FSCRS = Forms of self-criticising and self reassurance scale.
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For Peer Review

Table 3.

Intervention feedback data

	Never	1-2 times	3-4 times	≥ 5 times	
Week 1 (%)					
Practice using the audio files	6.3	18.8	12.5	62.5	
Practice on their own	18.8	18.8	18.8	43.8	
Practice of additional informal tasks	0	25.0	31.3	43.8	
Week 2 (%)					
Practice using the audio files	6.3	12.5	25.0	56.3	
Practice on their own	12.5	37.5	37.5	12.5	
Practice of additional informal tasks	6.3	31.5	25.0	37.5	
Week 3 (%)					
Practice using the audio files	12.5	12.5	31.3	43.8	
Practice on their own	6.1	25.0	31.3	37.6	
Practice of additional informal tasks	6.3	31.3	37.5	25.1	
Week 4 (%)					
Practice using the audio files	25.0	12.5	37.5	25.0	
Practice on their own	25.0	56.3	12.5	6.3	
Practice of additional informal tasks	12.5	31.3	31.3	25.0	
Usefulness of practices (%)					
	Useless	Not very useful	Not useless or useful	Moderately useful	Very useful
Mindfulness of the breath meditation	0	0	6.2	6.3	87.5
Body scan meditation	0	0	6.2	6.3	87.5
Soothing rhythm breathing	0	0	25.0	43.8	31.3
Mindful eating meditation	0	0	6.3	25.0	68.8
Compassion for others	0	0	18.8	25.0	56.3
Compassion for someone with eating difficulties	0	0	25.0	37.5	37.5
Compassion for self	0	0	12.5	25.0	62.5
Importance of programme materials (scale range 1-10)					
	<i>M</i>	<i>SD</i>			
Group introductory session	7.73	2.38			
Support manual	6.44	2.48			
Programme website	8.25	2.32			

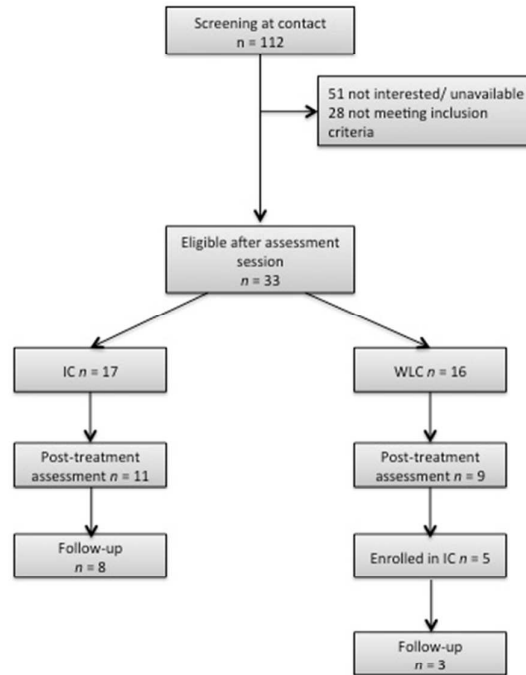
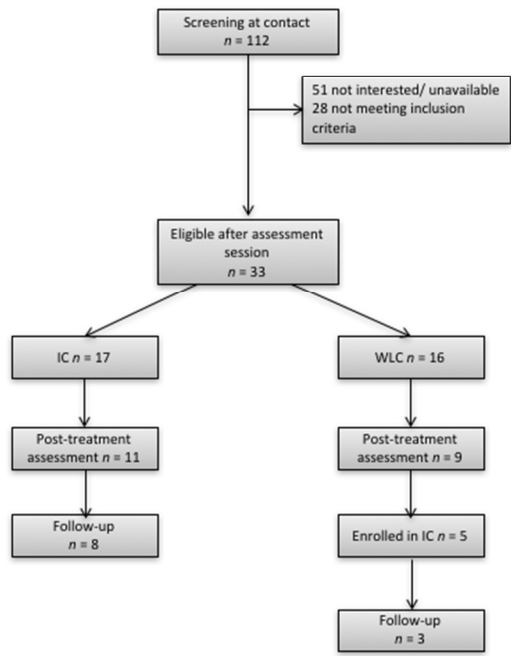


Figure 1. Participation flow chart

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Participation flow chart

254x190mm (72 x 72 DPI)

Review